



Lea Castle Farm

Wolverley, Worcestershire

Planning Application for Sand and Gravel Extraction

Hydrological & Hydrogeological
Impact Assessment and my
Interpretation of the Information
Provided by BCL Hydro on the
behalf of the NRS Aggregates Ltd



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All our comments are based in the main on the document produced for N.R.S. Aggregates Limited by BCL HYDRO unless otherwise stated at subject point.

Lea Castle Farm

Wolverley, Worcestershire

Planning Application for Sand and Gravel Extraction and Progressive Restoration to Agricultural Parkland, Public Access and Nature Enhancement

Hydrological & Hydrogeological Impact Assessment

21st October 2019



1 Governing Bodies and Interested Parties

1.1 Natural England is not satisfied that the proposed activities being carried out in strict accordance with the details of the application, as submitted, will not damage or destroy the interest features for which the sites have been notified. We have serious concerns over the potential impacts of this proposed mineral site. There is already an issue with water levels in this area which is impacting on the SSSIs. Without detailed information on proposed works, mitigation and monitoring we would be unable to support these proposed mineral site applications due to the risk they pose to the hydrologically sensitive SSSIs in the area.

Relevant consultee responses to the principal of mineral extraction at the Site as submitted to the Third Stage Consultation upon the emerging Worcestershire Minerals Local Plan that currently is not complete at the time of this report.

1.2 Severn Trent: The proposed site is contained within the groundwater catchment area for our abstraction boreholes at Beechtree Lane, including Source Protection Zone 3. As this site is located on the Wildmoor Formation from which the Beechtree Lane boreholes abstract, any proposed development of this site may pose a risk to the Public Water Supply abstraction at Beechtree Lane in terms of water quality (and potentially resource). Given the distance from the abstraction boreholes, we consider that the site may be suitable for mineral development or may be acceptable in planning terms. **But if this site was to be developed, we would ask that monitoring and mitigation controls (i.e. groundwater quality and observation boreholes) were included as part of any further development proposal.**

1.3 South Staffs Water: Site is within the total catchment of Cookley pumping station. Development of this site should proceed with caution and close regard to the protection of water resources. We will be carrying out further studies to evaluate their threat to public water supply and reserve the right to object in future.

1.4 Environment Agency: - Site is situated on a Principal Aquifer (the Wildmoor Sandstone) within Source protection Zone (SPZ) 3 of the Cookley Water Supply a sensitive hydrogeological Setting requiring careful assessment prior to development. Quarrying can remove aquifer materials and reduce groundwater resources which can lead to severe impacts upon the water environment, particularly where watercourses derive baseflows from such groundwater resources or where wetlands are reliant on such groundwater. Where significant potential for impacts are identified by assessment, mitigation measures should be developed to reduce such impacts to acceptable levels.

Concern is expressed regarding the potential for dewatering, should this be undertaken, to lower groundwater levels and cause impact upon dependant features such as watercourses, ponds, springs and wetlands.



The EA advise that there are several watercourses in the area which may derive baseflows from groundwater contained within the deposits forming the economic mineral of the Proposed Development. A Water Features Survey should be undertaken to identify those sources which could be at risk and a quantitative assessment undertaken to determine the potential for impact. In particular assessment should consider:

1. The proximity of this quarry to the Cookley Public Water Supply. The proposed development is within Source Protection Zone 3. Pollution prevention measures will be important in protecting this source;
2. Whilst the likelihood is that the quarry will not intercept the water table, groundwater levels may shallow significantly towards the River Stour. In addition, reductions in public water supply abstraction in this area have resulted in rising groundwater levels. There should be no dewatering or interruption of flows;
3. We have no records of licensed or de-regulated groundwater supplies in or near the development site. There is a record of a well on the BGS website but it appears disused. It will be prudent for the applicant to consult with the local authority for private supplies, and;
4. During the excavation of the soils, care should be taken how they are stored and restored to prevent release of nutrients (principally nitrate) stored in the soils.

The EA advise that the following activities can give rise to degradation of environmental water quality: 1. The storage and use of fuels;

2. Inappropriate location and / or management of onsite sewerage facilities;
3. Inappropriate discharge of mineral processing waters, and;

The EA advise that the site falls within the Worcestershire Middle Severn sandstone groundwater body which is currently of "Poor Overall Status" with an ambition to attain "Good Overall Status" by 2027. The EA believe the proposed development should seek opportunities to provide betterment in this regard and highlight the importance of addressing Water Framework Directive objectives within assessment.

The EA advise that the Site is located in Flood Zone 1 (the zone of lowest flood risk); exploration of opportunities to provide net flood risk betterment is advocated

The EA advise that they will object to any proposal within SPZ 2 or 3 or within a Principal Aquifer where landfill risk assessment, taking into account the nature and quantity of waste and the natural setting and properties of the location, demonstrates the requirement for active long-term site management for the prevention of groundwater pollution.

1.5 North Worcestershire Water Management: - NWWM comment that the Site is located within the catchments of the Stour and the Blakedown Brook, itself a tributary of the Stour and that it does not contain any natural or man-made surface watercourses which suggests that it is drained via percolation to groundwater which recharges the wetland SSSI's of the valleys to the west and east (Blakedown Brook and Hurcott & Podmore Pools respectively)

NWWM request that assessments should address, as a minimum:



1. The Hydrology and hydrogeology of the Site and the interaction with surrounding areas including water dependant SSSI's;
2. Flood risk on the Site and the effects of development on off-site flood risk;
3. The effects of implementing the Proposed Development during the operation phase and following restoration (*i.e.* the effect of imported inert materials), and;
4. Methods to safeguard groundwater and surface water.
5. Provision of a surface water drainage strategy to encompass both the operational and post restoration phases of development to be compliant with SuDS principles.

2 Sites of Special Scientific Interest

In my opinion these sites are at high risk of being polluted or destroyed from the ground being disturbed and the changes to the water table that are unknown due to the extraction of minerals from this site.

2.1 These sites are within 1km of the Proposed Sites and are of Special Scientific Interest: -

- Hurcott
- Podmore Pools
- Stourvale Marsh
- Puxton Marsh

3. Have BCL HYDRO answered the Governing Bodies and Interested Parties Concerns?

3.1 Natural England Concerns

Natural England have pointed out that water levels in this area which would impact on the SSSIs. BCL Hydro have only confirmed in my opinion by using existing data on rainfall and surface water along with the disturbance of the top soil that would normally act as a natural filter which will then affect the local water table and therefore will have an impact on the SSSIs.

3.2 Severn Trent Concerns

The proposed site is contained within the groundwater catchment area for our abstraction boreholes at Beechtree Lane, including Source Protection Zone 3. As this site is located on the Wildmoor Formation from which the Beechtree Lane boreholes abstract, any proposed development of this site may pose a risk to the Public Water Supply abstraction at Beechtree Lane in terms of water quality (and potentially resource). Given the distance from the abstraction boreholes,

Severn Trent have concerns over local water supplies and have said if this site was to be developed, they would ask for monitoring and for mitigation controls to be put in place (i.e. groundwater quality and observation boreholes) BCL Hydro have not shown when these monitoring activities will be undertaken and where the monitoring will be taken from. They also haven't shown how they would recommend how they would control any contamination to the local water supplies.

3.3 South Staffs Water concerns

Site is within the total catchment of Cookley pumping station. Development of this site should proceed with caution and close regard to the protection of water resources.

Below is what BCL Hydro have to say about the Cookley pumping station

The closest of these public water supply groundwater sources to the Site is operated by South Staffordshire Water Limited at Cookley Pumping Station, which is situated c. 1,360m to its north (at NGR: ³844, ²807).

The mapped boundaries for the Outer (SPZ2) and Inner (SPZ1) source protection zones associated with the Cookley groundwater sources approach to c.760m and c.1170 of the northern boundary of the Proposed Development.

Information obtained from the BGS indicates abstraction at the Cookley Pumping Station is made from up to 3-no. boreholes.



For reasons of security of water supply, borehole logs for the Cookley Pumping Station remain confidential, as is the case for all other public water supply boreholes within the region.

Notwithstanding the lack of information, it can be assumed with almost certainty that all boreholes within the clusters implied by SPZ mapping shown at *figure 12* abstract from the SSG aquifer.

In my opinion this is not an answer to whether the Cookley pumping station is going to be affected or not. They don't even suggest how they will monitor the situation.

3.4 Environment Agency Concerns

The EA advise that there are several watercourses in the area which may derive baseflows from groundwater contained within the deposits forming the economic mineral of the Proposed Development. A Water Survey should be undertaken to identify those sources which could be at risk and a quantitative assessment undertaken to determine the potential for impact. In particular assessment should consider:

1. The proximity of this quarry to the Cookley Public Water Supply. The proposed development is within Source Protection Zone 3. Pollution prevention measures will be important in protecting this source;

On reading section BCL Hydro report section 3.10.8 Source Protection Zones & Public Groundwater Supply Abstractions all that can be taken from their notes is that where these sites are. There is no explanation on how they are going to safeguard the extraction of drinking water or how they were going to monitor the effects of mineral extraction

The EA advise that the following activities can give rise to degradation of environmental water quality:

1. The storage and use of fuels;

I personally have plenty of experience in this area, unless these maintenance operations are undertaken in a secured concrete bunded area then there will always be the chance of contaminating the ground and these materials will enter the water table.

Another possibility of soil contamination is from plant bursting hoses and pipework and mechanical breakdown of moving parts during the operation of the plant on site. Containing these leakages in practise is impossible and then we would have contamination problem which would enter the water table in fact, BCL Hydro in their table 14 Impact screening page 48, they say it won't happen but it does even on new well-maintained plants.



2. Inappropriate location and / or management of onsite sewerage facilities;

BCL Hydro have made no comment on this so this would need addressing

3. Inappropriate discharge of mineral processing waters, and;

BCL Hydro have made no comment on this so this would need addressing

The EA advise that they will object to any proposal within SPZ 2 or 3 or within a Principal Aquifer where landfill risk assessment, taking into account the nature and quantity of waste and the natural setting and properties of the location, demonstrates the requirement for active long-term site management for the prevention of groundwater pollution. I have concerns on how rigorously this will be carried out given the landowners track record with his previous Quarry just down the road from this site and his ability to communicate with the County council over Lea Lane.

3.5 North Worcestershire Water Management Concerns: -

NWWM request that assessments should address, as a minimum:

1. The Hydrology and hydrogeology of the Site and the interaction with surrounding areas including water dependant SSSI's;

The concerns of North Worcestershire Water Management (NWWM) were that the hydrology and hydrogeology risk assessment should identify risk to the water dependent SSSIs. They have quoted fact & figures i.e. distances but they haven't shown how to eliminate the risk.

2. Flood risk on the Site and the effects of development on off-site flood risk;

BCL Hydro say that a flood risk assessment has been undertaken and that it won't be a problem on or off site. They don't say how they recommend it should be monitored because of the site changing its dynamics or how they would tackle any problems arising from the risk of floods.

3. The effects of implementing the Proposed Development during the operation phase and following restoration (*i.e.* the effect of imported inert materials)

BCL Hydro recommend that all incoming materials will be subject to inspection and segregation prior to landfilling. Any wastes requiring testing will be assessed in accordance with Waste Acceptance Criteria procedures to ensure only inert materials are accepted for landfill.

The waste materials to be deposited, which will comprise soils and stones, will be inert and therefore incapable of generating a potentially or contaminating the water table. Our main concern here is who will be checking that the materials are inert and safe to use? Because if its self-regulating then there's always room for 'just this once we will let that go' as it would be too much trouble to send it back.



4. Methods to safeguard groundwater and surface water.

BCL Hydro recommend that prior to backfilling with inert waste, the base and side-walls of the quarried voids will be lined with suitable inert material. The liner will be tested to ensure it has an attenuating effect equivalent or greater than that provided by a 1m thick liner with a hydraulic conductivity $1e^{-7}$ m/s or less.

Please note that hydraulic conductivity is one of the most variable and yet most important parameters in estimation of contaminant travel over time. This means that eventually the 1m thick liner that is proposed will allow contaminates through which will then eventually contaminate the water table. This could be years after the quarry is finished with and it will be the problem of future generations which is certainly unfair and immoral for us to leave to them.

5. Provision of a surface water drainage strategy to encompass both the operational and post restoration phases of development to be compliant with SuDS principles.

I have concerns about any report that incurs flooding & water draining to be satisfactory because all you need to do is have a walk along Lea Lane to see the state of the boundary wall and the collapsed road that has been out of action for several years now. You then will understand what pressure the wall must be under from the ground the other side. Generally, I would have thought that the washing of soil deposits against the wall has started it to bow over into the road. Just like the collapse of the road along Lea Lane into the canal by water washing the road away I would have serious concerns about disturbance of the ground on the opposite side of the wall with heavy machinery creating dips where water will congregate and possibly wash the ground away causing further damage to the wall & road.

4 Sites of Special Scientific Interest

These sites are within 1km of the Proposed Sites and are of Special Scientific Interest: -

- Hurcott
- Podmore Pools
- Stourvale Marsh
- Puxton Marsh

The data below is from BCL Hydro report and there is no definite answer either way as to the possibility of pollution through the water table affecting these SSSI

The NE data shows that 5-no. Sites of Special Scientific Interest (SSSI) are present within a 3km radius of the Site Boundaries.

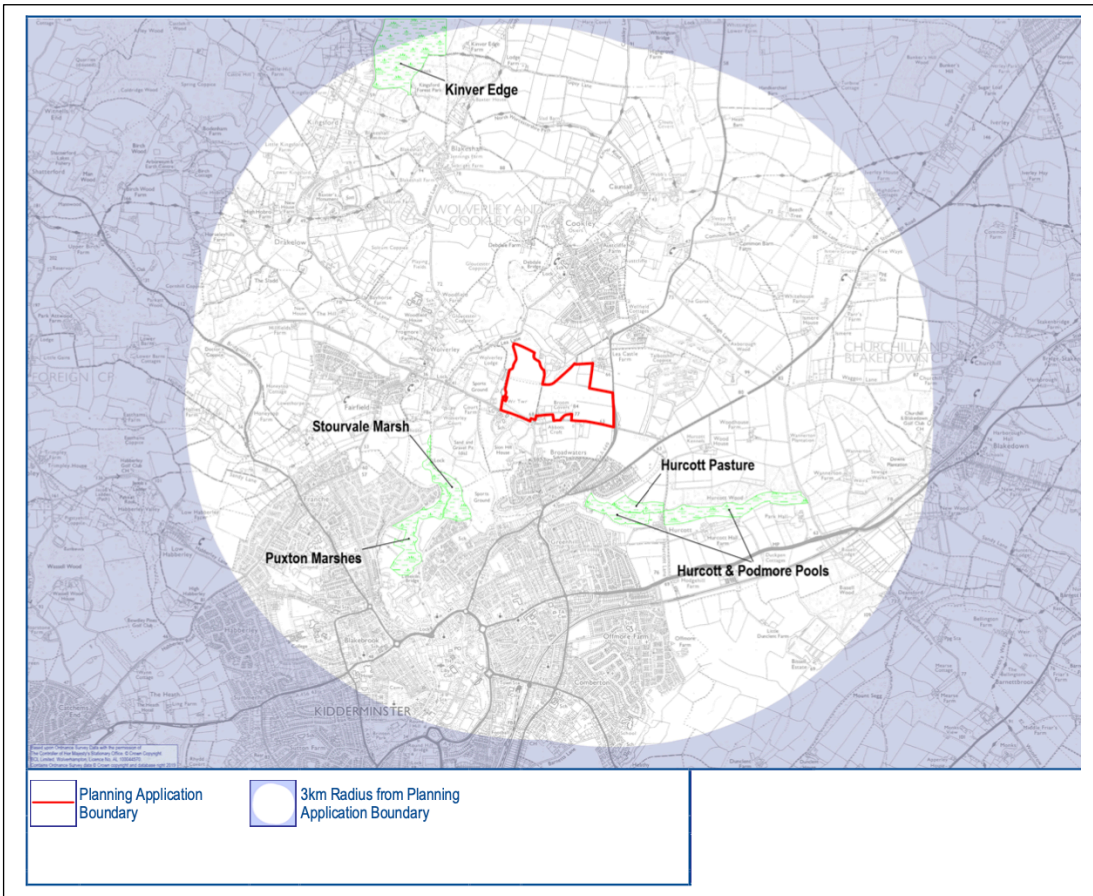


Table 4 Statutorily Protected Sites within 3km of Proposed Development		
Site Name	Distance* and Direction from Proposed Development	Description
Hurcott Pasture	640m SE	TBC
Hurcott & Podmore Pools	660m S	TBC
Stourvale Marsh	820m SW	TBC
Puxton Marshes	970m SW	TBC
Kinver Edge	2,550m NNW	TBC

*-at shortest distance from the boundary of the Planning Application

The “accidental” failure to address potential damage to trees in the ancient wet woodland at Hurcott Woods or the potential for pollution to the water table affecting these sites seems all the more concerning when set against concerns specifically raised in the Worcester County Council Scoping Opinion dated 29th June 2018 produced in relation to the quarry application, which were never addressed.

It may be worth noting in this context that Severn Trent has designated Hurcott Pool as a reservoir. This makes it more important to residents that the water table is protected.



I feel that the lack of information on the possible pollution as the SSSI warrants further investigation. For example, would there be a geological survey specifically targeting the prospect of contamination of these SSSI?

Without further investigation planning consent should not be given otherwise we would be at danger of losing these Sites of Special Scientific Interest.

My Conclusion of BCL Hydro report that was commissioned by NRS Aggregates Ltd and dated the 21st October 2019 Document ID CD1.13

I'd like to introduce myself to give you an understanding of my prospective on the BCL Hydro report. I'm Dean Talbot and I have lived in Cookley for more than 35 years. My main profession for over 47 years was as a Hydraulic Engineer predominantly working in heavy industry and progressing into Site plant like Terex and JCB on the design and prototype building of these machines. I have a strong understanding how fluids react to certain conditions and how filtration is designed to work. This has been a big part of my career and for this reason I chose to decipher this report.

It's without doubt that BCL Hydro report hasn't answered any of the main concerns from Natural England, Severn Trent, South Staffs Water, Environment Agency, North Worcestershire Water Management and specifically on the question of the triple SIs. They have only skirted around the subjects by reporting distances from sites and present rain fall in the area. They haven't given answers on how to mitigate problems if they should arise.

Having read, the BCL Hydro report several times I fear the local Hydrological and Hydrogeological environment is at risk from this development. To summarise some of the points in my main report which I have submitted to Helen Skinner I've made a small list, they are: -

- Domestic drinking water supplies through the use of bore holes and reservoirs like: - Hurcott Pool and Cookley Pump House to name but a few. This could affect the supply of water to around 60,000 residents in Kidderminster, Cookley and Wolverley at the last count. This would be from contamination during the excavation of minerals and the deposit of waste to land fill which over time will contaminate the water table. BCL have not given any answers on how these supplies will be protected only that excavation will be above the water table. In my mind this is not an answer as by way and nature of the animal the water will travel from the excavation to the water table and carrying the contaminates from above with it.

You might say that this will happen anyway and yes, you're right but the fact of the matter is there's more natural material there at present that the rain water has been filtering through, which includes top soil, sand and gravel deposits acting as a natural filter since time began.

- I have concerns on the waste that will be imported to the site which are twofold.
 - A. The first one is the 1m thick liner with a hydraulic conductivity $1e^{-7}$ meter/second. This liner will allow contaminates through by way of washing contaminates off the waste above and through the 1m liner to contaminate the water table.
 - B. The second part is the waste is supposed to be inert that is brought to site. I believe NRS Aggregates Ltd will find it difficult to find sufficient inert materials, one of many reasons is because a lot of these materials are now being recycled these days, by machinery designed to turn rubble into different grades of hard core for example. Because of this I fear that NRS will re-apply for an amendment to the planning consent to be able to bring more toxic materials to site blaming the lack of materials that are available. This would put our planning department into a situation they possibly cannot deal with and the wrong decision could be made.

I therefore suggest that if the Quarry was given permission to go ahead that strict guide lines were set out as to the type of waste that would be acceptable and that there was no deviation allowed in the future i.e. reapplying for an amendment to the planning consent.

- With contamination in mind we have no less than four sites of triple SIs within 1km of the site. These areas are at risk from contamination from air pollutants from this development, but more disturbingly is the damage to the water table that these sites thrive off. I don't believe that BCL Hydro have said how these sites are going to be protected. For this reason alone, this planning application should be denied as they are protected sites.
- My last point is erosion of land down towards the canal and the Stour from rain fall and the dampening of dusty areas to control the fallout of dust from the site as previously mentioned by NRS Aggregates Ltd as a dust controlling method.
You only have to see the state of the wall running along Lea Lane and the collapse of the road to understand my concerns. The excavation will be going lower than the wall and road foundations this could wash the fabric of the foundations away even though the excavation will be some distance away from the wall and road.

This is especially prominent with the non-compliance of the land owner to cooperate with the local council with regards to the collapse of Lea Lane road and causing the loss of an amenity to the local community.