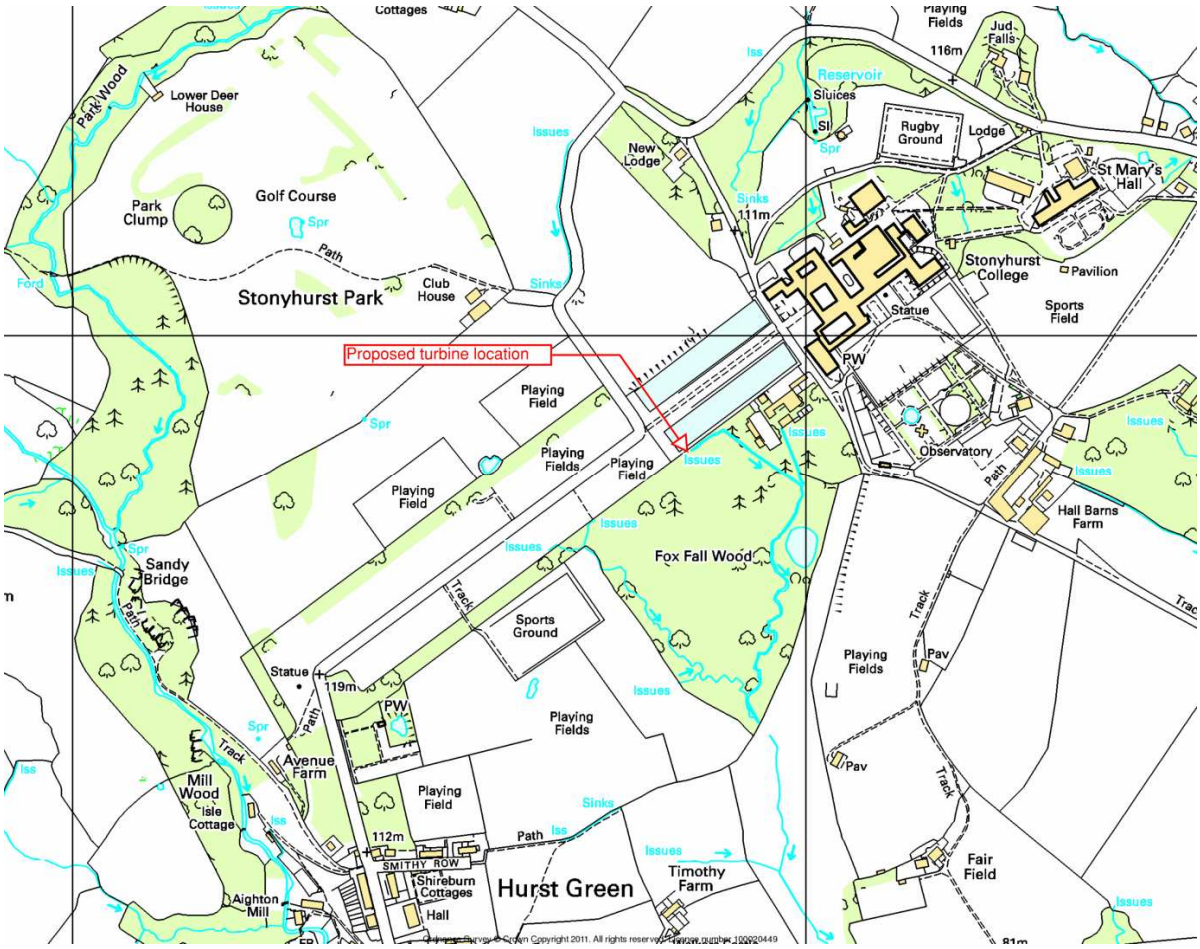
Site 17: Stonyhurst College, Hurst Green

Site Assessment

Figure 1 Map showing general layout



Stonyhurst College is an independent Roman Catholic school on the Stonyhurst Estate next to the village of Hurst Green. It is a Grade I listed building. The building has housed the college since 1794, before this it was a private house. The estate contains many small streams and springs, as well as several ponds. Unfortunately these are quite disseminated across the college grounds, and it has proven difficult to design a scheme that would harness the fall and flow of the various streams. It is understood that there is a former mill building on the estate. The mill is understood to date back to 1840 when it was a corn mill, but has later 19th century additions. It is a Grade II listed building. It is not thought that any original machinery resides within the building. We have not investigated re-using this building.

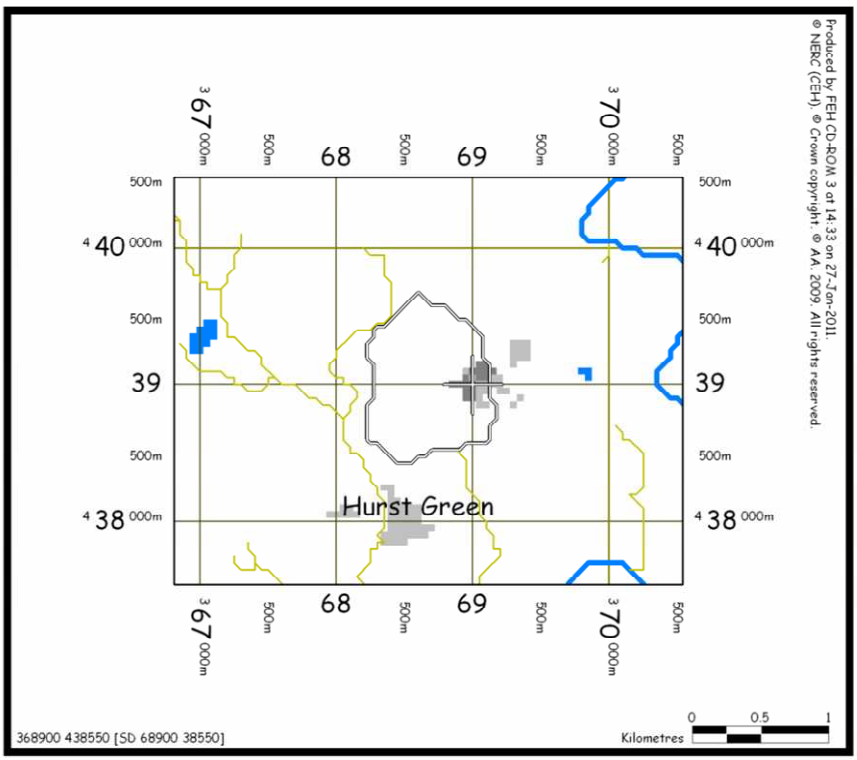
The simplest and most economic scheme here harnesses the outfall from the two parallel ponds at the front entrance, where water flows into Fox Fall Wood. This is a small scheme and is unlikely to be economic, but if an inexpensive turbine could be procured, its development may make an interesting project. The energy produced would make only a small contribution to the College's needs.

Figure 3 The v-notch measuring weir

Figure 4 The outfall from the reservoirs

Catchment Analysis

Figure 5 Catchment boundary defined by Flood Estimation Handbook Software



The Flood Estimation Handbook software is used to determine the following catchment descriptors, for the proposed intake location, selected during the site visit.

Intake Grid Reference	368840, 438845
Powerhouse Grid Reference	368840, 438845
Catchment Area	0.87 km^2
Annual Rainfall	1259 mm

Annual Flow Statistics

Unfortunately the Low Flows software that is used to produce a Flow Duration Curve (FDC) demonstrating how the river flow varies throughout the year is not suitable for this site, as there has been considerable human influence on the flow regime for such a small catchment. There are some existing abstractions on this watercourse too, by Stonyhurst College itself, and these are likely to remain in use. However, the main influences are the presence of ponds, and these are likely to have a positive impact on the annual variation in flows, by essentially flattening the flow duration curve and making the flow slightly more consistent over the year.

Hydropower Analysis

The catchment area and head are too small to run the Hydra program. Therefore an enlarged catchment (0.87km^3 to 1km^3) was used to determine a mean flow value shown in the table below. Hydra could not run a power report, so the standard power equation was used to establish a rated capacity of 0.27kW. This is not suitable to support a commercial scale build.

Table 3 Hydropower Analysis

Gross Head [m]	1.7
Net Head [m]	1.615
Design Flow [m^3/s]	0.021
Rated Capacity [kW]	0.27
Average Annual Energy Output [MWh]	Unknown
Average annual Carbon Dioxide offset	Unknown

Impact Assessment

StonyhurstCollege is within the Area of Outstanding Natural Beauty of the Forest of Bowland, and is classified as Undulating Lowland Farmland with Parkland. It is a Grade I listed building, but any development is unlikely to impact the estate buildings, as construction could broadly be completed by hand, and any visual impact would be screened by the woodland. Some advice may need to be sought if alterations need to be made to the pond perimeter. The park and garden at Stonyhurst is Grade II* Listed.

Statutory Requirements

It may be necessary to apply to the Environment Agency for an abstraction licence, but it is unlikely to be required as the streams within the grounds are not thought to be classified as 'main rivers'. Advice will need to be sought as to whether planning permission is required.

An ecologist will be able to advise on the extent of environmental investigation required.

Budget Development Cost

The total budget cost for the whole scheme is **£85,700**. It should be noted that the civil works costs can vary considerably as material costs fluctuate. Likewise, mechanical and electrical (M&E) equipment costs vary in accordance with demand. Professional fees should be considered subject to change, as the scope of licensing and planning requirements are not yet defined. Consequently the budget estimate at this stage should be considered accurate to plus or minus 20%. See Table 4

Revenue and Simple Payback period

Any energy produced by this scheme would be consumed on site, and a grid connection would not be necessary. Under the current government feed-in tariff regulations, hydropower schemes receive a generation tariff according to their rated capacity. Schemes less than 15kW receive 19.9p/kWh. This generation tariff is received regardless of how the electricity is used. The owner has indicated that the electricity would be used on site, thereby offsetting import costs. This increases the value of the generated electricity by the import tariff, which can be assumed at 5p/kWh.

The annual average energy produced by this scheme cannot be calculated due to the altered flow regime.

Conclusion

This is a very small scheme and is not economically viable unless it can be built very cheaply. The amount of energy produced will make a very small contribution to the needs of the estate.

Further Information

This site report is produced by Inter Hydro Technology on behalf of Forest of Bowland AONB, and funded by a partnership including Lancashire County Council, Lancaster & District Local Strategic Partnership, Pendle Borough Council and Ribble Valley Local Strategic Partnership.

This site report should be read in conjunction with the rest of the Forest of Bowland AONB Hydro Feasibility Study which can be downloaded at

http://www.forestofbowland.com/climatechange#hydro

Table 4 Development Budget Cost

Budget Scheme Cost Estimate
Stonyhurst College

ITEM	UNIT	QUANTITY	MIN	MAX
Turbine				
Turbine Quotation	No	1	£20,000.00	£25,000.00
Grid Connection				
Grid Connection	No	1	£0.00	£0.00
Civils				
Weir	m^3	3	£1,500.00	£1,875.00
Fish Pass	m^3	0	£0.00	£0.00
Metalwork	m	1	£2,000.00	£2,500.00
Fish Pass Length	m	0	£0.00	£0.00
Pipe Installation	m			
Rock	m	0	£0.00	£0.00
Gravels	m	20	£800.00	£1,000.00
Soft	m	20	£1,100.00	£1,375.00
Pipe Materials	No	1	£0.00	£0.00
Temporary Access	m			
Rock	m	0	£0.00	£0.00
Gravels	m	0	£0.00	£0.00
Soft	m	200	£11,000.00	£13,750.00
Temporary Access on Good Ground	m	200	£8,000.00	£10,000.00
Powerhouse				
Powerhouse	kW	3	£500.00	£625.00
Prelims				
Duration	Months	3	£9,000.00	£11,250.00
Sub Total				
Sub Total			£53,900.00	£67,375.00
Professional Fees				
Professional Fees			£8,085.00	£13,475.00
Sub Total				
Sub Total			£61,985.00	£80,850.00
Contingency				
Contingency			£12,397.00	£16,170.00
GRAND TOTAL			£74,382.00	£97,020.00