

REPORT**Silent Valley Landfill***2019 Biological Monitoring of Nant Merddog Stream*

Submitted to:

Blaenau Gwent County Borough Council

Silent Valley Landfill Site

Cwm

Ebbw Vale

NP23 6PXZ

Submitted by:

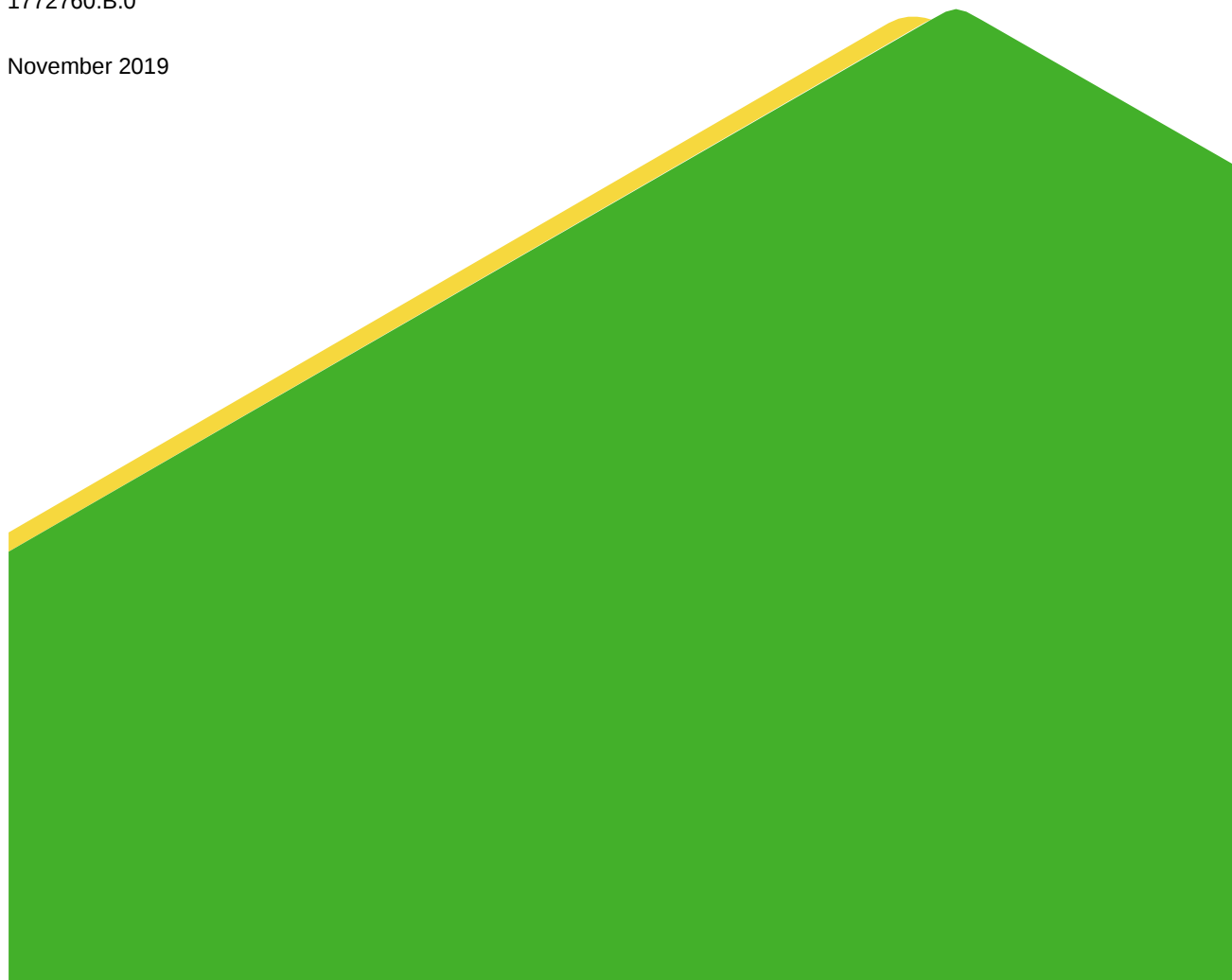
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1.0 INTRODUCTION

Golder Associates (UK) Ltd (Golder) was commissioned by Blaenau Gwent County Borough Council (hereafter BGCBC) to undertake biological monitoring of the Nant Merddog Stream at the Silent Valley Landfill Site near the village of Waun-lwyd within the County Borough of Blaenau Gwent. The Silent Valley landfill is centred at National Grid Reference SO 185 071 (Drawing 1).

1.1 Background

During 2010 and 2011 initial biological surveys on the Nant Merddog were undertaken by Golder, as a result of Compliance Assessment Reports issued by Environment Agency Wales (EAW) in spring 2010 (reference: RDR/100428/UP3335SN) and in winter 2011 (reference: RDR/110117/UP3335SN), respectively. Due to a reported leachate outbreak in 2011, BGCBC was required to propose further biological surveys of the Nant Merddog Stream. In line with Golder's recommendations and EAW guidance (now Natural Resources Wales (NRW)), biological surveys of the Nant Merddog have been undertaken ever since.

The objective of the invertebrate sampling surveys is to meet the requirements of the original EAW Compliance Assessment Reports.

1.2 Scope of Works

The work comprises biological (aquatic macro-invertebrate) monitoring of the Nant Merddog Stream, both upstream and downstream of the Silent Valley Landfill Site. The results are analysed and compared with previous results for the same stretches of the stream.

The work outlined within this report is a continuation of a monitoring programme that began in 2010. The scope of works remains fundamentally unaltered from 2010, with the continuation of spring and autumn monitoring events and reporting.

1.3 Biological Monitoring

The Biological Monitoring Working Party (BMWP) index is a common method for the assessment of water quality. This gives a score to freshwater habitat based upon the number of families of macro-invertebrates found in a sample. It works on the basic principle that freshwater pollution levels affect macro-invertebrate families differently. Thus, certain families that are most susceptible to pollution are scored maximum points. These include many families belonging to the mayflies (Ephemeroptera), stoneflies (Plecoptera) and caddis (Trichoptera). Conversely, those families that are tolerant of polluted waters are scored the least points and include families such as the leeches (Hirudinea), worms (Oligochaeta), chironomid midges (Diptera) and the freshwater hog-louse (Isopoda). Accordingly, high scoring watercourses are the cleanest with the highest water quality, whilst polluted watercourses score the lowest.

This method has been adapted to consider the presence of these family groups and their relative pollution tolerance or indeed intolerance. In essence, the presence of Ephemeroptera, Plecoptera and Trichoptera indicates a level of good ecological health. Conversely, if only pollution tolerant families were present such as Diptera and higher scoring families were absent, it may be concluded that the ecological health of the Site was poor.

2.0 SITE OVERVIEW

Silent Valley Landfill Site is a former operational landfill situated in Blaenau Gwent, South Wales. Whilst the landfilling operation has now ceased and re-contouring/restoration is underway, the Site continues to operate as a waste transfer station.

The Nant Merddog Stream rises at the head of the valley on Mynydd Carn-y-cefn and flows in a southerly direction. It is culverted beneath the landfill and toward the Silent Valley Reserve, part of which is designated as a Site of Special Scientific Interest (SSSI). The Nant Merddog joins the Ebbw Fawr Stream near the village of Cwm. The collection sump overflow (shown on Drawing 1 as the Silent Valley Lagoon) is located close to the southern limit of the landfill, at the point where the Nant Merddog Stream culvert emerges from beneath the landfill.

3.0 METHODOLOGY

3.1 General

Biological sampling of the Nant Merddog Stream was undertaken on the 5 March and 24 October 2019. This involved the sampling of aquatic invertebrates using the sampling method as summarised in the following paragraphs.

3.1.1 Site Selection

Biological sampling should ideally use sampling sub-sites (reaches) with a range of mesohabitats that are most likely to yield a diverse invertebrate community sensitive enough to detect changes in biological water quality. Riffles, where these are characteristic of the watercourse, are the first choice of mesohabitat to be sampled. In line with this, all the sample sites for this survey were located along riffles.

Samples were taken from four sites during the monitoring events, at the same locations used since commencement in 2010. Two were taken from upstream of the culvert, and another two from downstream of the discharge point (Drawing 1). The sampling method employs a presence, or indeed absence, and relative abundance score for the sampling sites. Families of aquatic invertebrates e.g. Ephemeroptera and Plecoptera are noted if recorded and their relative abundance also documented. This visual representation of invertebrate diversity is evaluated in the field and is also supplemented by a photographic record of the sampling sites including observations on water clarity, flow and odour as applicable.

4.0 RESULTS

4.1 Spring

Water levels within the Nant Merddog during spring were moderate. In accordance with previous results leaf litter and silts were observed, with most organic detritus being noted toward the lower reaches of the sample area around reaches (Sites) 1 and 2. This is consistent with the presence of riparian woodland. Water clarity was good throughout and no appreciable odour was noted.

Table 1: Spring 2019 Sampling Results – Relative Abundance (individual invertebrates) A=1; B=2 to5; C≥5

Site	Mayflies (Ephemeroptera)	Stoneflies (Plecoptera)	Caddis (Trichoptera)	Gammarus (Gammaridae)	Chironomid midges (Diptera)	Leeches (Hirudinea)
1	✓B	✓C	✓B	✓C	✓A	-
2	✓C	✓C	✓C	✓C	✓B	✓A
3	✓B	✓B	✓B	✓C	✓B	-
4	✓	-	✓A	✓B	-	-

4.2 Autumn Monitoring Data

Water levels within the Nant Merddog during the autumn were relatively high. Autumn 2019 experienced high rain fall and the Nant Merddog was flowing at a level higher than during previous Autumn surveys. In accordance with the Spring survey, lower reaches (Sites 1 and 2) contained frequent leaf packs and detritus under stones, symptomatic of the presence of riparian woodland. Water clarity was reasonably good throughout the survey sites despite the elevated flows and no appreciable odour was noted.



Figure 1: Aquatic invertebrate Samples in sorting tray, Site 3 Autumn 2019.

The results from the Autumn monitoring survey is provided in Table 2.

Table 2: Autumn 2019 Sampling Results Relative Abundance (individual invertebrates) A=1; B=2 to 5; C=≥5

Site	Mayflies (Ephemeroptera)	Stoneflies (Plecoptera)	Caddis (Trichoptera)	Gammarus (Gammaridae)	Chironomid midges (Diptera)	Leeches (Hirudinea)
1	✓C	✓C	✓B	✓B	✓A	✓A
2	✓C	✓C	✓C	✓C	✓A	✓A
3	✓C	✓B	✓B	✓B	✓B	-
4	✓B	✓B	✓B	✓A	-	-



Figure 2: Stonefly (Plecoptera) larvae from Site 1 Autumn 2019

5.0 EVALUATION OF RESULTS

5.1 Spring Data

The most recent spring results (2019) indicate that the water quality was again considered to be clean. All Sites surveyed contained Mayflies (Ephemeroptera) and Stonefly (Plecoptera) larvae. Both of these groups of aquatic invertebrates are relatively intolerant of pollution and their presence indicates that the ecological health of the stream is in reasonable order. Site 4 did not produce stonefly larvae, however, Site 4 is situated at the highest elevation of all the sampling sites and as such, is generally lower in flow being close to the source of the Nant Merddog. Accounting for the occasional low flows in this area, this Site has often produced slightly lower biodiversity of aquatic invertebrates. The general diversity and relative abundance of aquatic invertebrates indicates that there has been no appreciable adverse impact to the aquatic habitat.

5.2 Autumn Data

The most recent Autumn results (2019) indicate that the water quality was again considered to be clean. All Sites surveyed contained Mayflies (Ephemeroptera) and Stonefly (Plecoptera) larvae. As previously indicated, both of these groups of aquatic invertebrates are relatively intolerant of pollution and their presence indicates that the ecological health of the stream is in reasonable order. The general diversity and relative abundance of aquatic invertebrates indicates that there has been no appreciable adverse impact to the aquatic habitat.

6.0 CONCLUSIONS

The continued presence of pollution-sensitive invertebrate families indicate that the Nant Merddog remains in good health, which suggests that the stream is presently not negatively affected by current or historical operations at the Site. Pollution intolerant aquatic invertebrates of differing age classes were found upstream and downstream of the landfill operation. The standardised survey methodology provides an appropriate

strategy to monitor the aquatic ecology of the stream. The continued monitoring of the Nant Merddog will enable any impacts associated with historical landfilling operations to be identified should they occur. The next round of monitoring surveys will occur in spring 2020.

7.0 REFERENCES

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Signature Page

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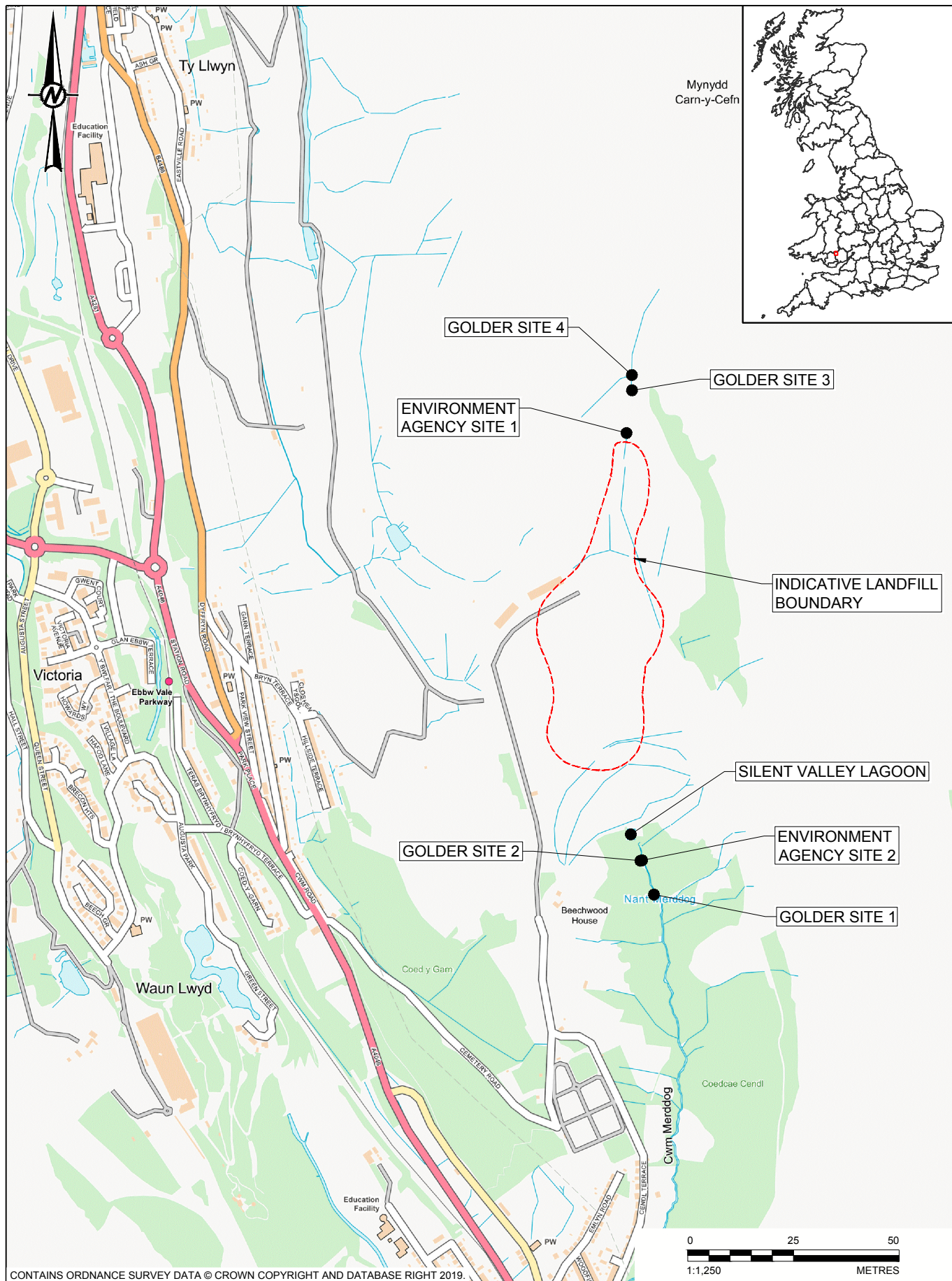
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APPENDIX A

Site Location Plan



CLIENT
BLAENAU GWENT CB COUNCIL

PROJECT
BLAENAU AQUATIC ECOLOGY SILENT VALLEY

CONSULTANT



YYYY-MM-DD 2019-02-27

DESIGNED RM

PREPARED ECS

REVIEWED FB

APPROVED FB

TITLE

AQUATIC INVERTEBRATE SAMPLING LOCATIONS

PROJECT NO.
1772760

CONTROL
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REV.
A

DRAWING
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