HYDROGEO

Waste Recovery Permit

Hydrogeological Risk Assessment

Bryn Recycling

Gelliargwellt Farm, Gelligaer Road, Gelligaer.

On Behalf of

Bryn Recycling Ltd

Quality Management

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1 Introduction

1.1 Background

Hydrogeo Limited (Hydrogeo) has been commissioned by Bryn Recycling Ltd (the Client) to undertake a Hydrogeological Risk Assessment to support a Waste Recovery Permit for the proposed development of an extension to the existing Materials Recycling Facility (MRF) operational area at Gelliargwellt Farm, Gelligaer Road, Gelligaer.

The work is necessary to provide a storage area for soils produced as part of the recycling operations undertaken at the site. The new surface will be concreted which will be laid to designed falls, thus controlling surface water run-off from the extension area. The surface water run-off will be collected in a proposed attenuation pond, prior to being directed to a series of 3 lagoons to the west, at the bottom of the newly formed slope. The lagoons will discharge through a flow restriction device to an adjacent watercourse. The watercourse itself eventually discharges into the Nelson Bog SSSI, some 800m south of The Site.

The hydrogeological risk assessment has been progressed in line with guidance published by Natural Resources Wales (NRW) 'Carry out a risk assessment for a bespoke permit to deposit waste for recovery'. This Guidance also references the GOV.UK guidance 'Groundwater risk assessment for your environmental permit'.

1.2 Planning Application

A planning application was submitted to Caerphilly County Borough Council (CCBC) on 24th June 2022, and validated by CBCC on 27th June 2022. The application proposal is covered by planning reference 22/0567/FULL, and relates to;

"*Conduct engineering works to provide site drainage, an enhanced landscape bund and areas of hardstanding along with landscaping and associated works for the more efficient storage of recyclable waste".*

A number of specialist consultees have provided their feedback, comment and pre-application correspondence in regard to the development, including those relevant to this Risk Assessment below:

- The Coal Authority;
- Natural Resources Wales (NRW);
- Caerphilly County Borough Council (CCBC) – Drainage;
- Caerphilly County Borough Council (CCBC) – Environmental Health;

- Merthyr County Borough Council.

The Coal Authority

The Coal Authority provided initial comment on 26th July 2022. In the letter, the coal authority raised **no objection** to the application on the basis that the supporting Coal Mining Risk Assessment (15th March 2022, prepared by Blandford Consulting) was able to conclude that coal mining legacy did not pose a risk to development at the site.

The Coal Authority most recently provided a consultation response on the 26th June 2023, available review on the Local Planning Authority Website. The Coal Authority noted that the only additional document published since their previous comment is an RS Pro materials datasheet. The Coal Authority therefore made no further comment, however, consider that the comments, recommendation and advice to the applicant set out in the 26th July 2022 letter remain valid and relevant to the decision-making process.

Natural Resources Wales (NRW)

Natural Resources Wales (NRW) provided their initial consultation response on 3rd August 2022. NRW objected to the planning application, requiring further details, including:

Protected Sites and Protection of Controlled Waters

The proposed works are approximately 500m from Nelson Bog Site of Special Scientific Interest (SSSI), and it appears there is hydrological connectivity between the site and the SSSI. We note the submission of Drainage Plans. We have concerns over the proposed wetland system (Reed Beds) for the treatment of run-off. Therefore, we advise you seek further technical information on the construction and design of the reed bed system from the applicant.

We also advise that an individual breakdown of the proposed drainage plans for each section of the site that will be entering the attenuation lagoons, existing lagoons and reed beds is provided. This will allow us to fully assess the potential impacts to the SSSI from the site. We note the submitted document Proposed Water Management Statement, prepared by JPCE Limited, June 2022. Previously, we commented on the material to be used to raise the ground levels to make this extension area. We note this will require an Environmental Permit (Waste Activity) and therefore will comment on this during the permit application. We understand this will be completed with a hardstanding surface.

Pollution Prevention

Due to the presence of controlled waters, and the site's hydrological connectivity to the nearby SSSI, we would advise that the Local Planning Authority (LPA) includes the following condition on any permission they are minded to grant: Condition: No development, including site clearance, shall commence until a site wide Construction Environmental Management Plan (CEMP) has been submitted to and approved in writing by the Local Planning Authority. The CEMP should include:

• General Site Management: details of the construction program including timetable, details of site clearance; details of site construction drainage, containments areas, appropriately sized buffer zones between storage areas (of spoil, oils, fuels, concrete mixing and washing areas) and any watercourse or surface drain.

• Control of Nuisances: details of restrictions to be applied during construction including timing, duration, and frequency of works; details of measures to minimise noise and vibration from piling activities, for example acoustic barriers; details of dust control measures; measures to control light spill and the conservation of dark skies.

• Pollution Prevention: demonstrate how relevant Guidelines for Pollution Prevention and best practice will be implemented, including details of emergency spill procedures and incident response plan.

• Details of the persons and bodies responsible for activities associated with the CEMP and emergency contact details The CEMP shall be implemented as approved during the site preparation and construction phases of the development.

Justification: A CEMP should be submitted to ensure necessary management measures are agreed prior to commencement of development and implemented for the protection of the environment during construction.

NRW provided further comment on the planning application in a letter dated 11 July 2023, and included comment on the Plastic Management Strategy, Environmental Permitting and Pollution Prevention as follows:

Pollution Prevention

We previously requested a Construction Environmental Management Plan (CEMP) to be conditioned. In our previous response dated 09/05/2023 (our ref: CAS-215888-B5Z4) we noted the submission of a CEMP and advised the CEMP needs to be updated to reflect

more appropriate measures to remove plastics from the surface water flow at source. We note an updated CEMP has not been provided and as such continue to request a CEMP be a condition on any permission granted.

Environmental Permit

Our previous advice dated 03/08/2022 remains relevant 'We note the submitted document Proposed Water Management Statement, prepared by JPCE Limited, June 2022. Previously, we commented on the material to be used to raise the ground levels to make this extension area. We note this will require an Environmental Permit (Waste Activity) and therefore will comment on this during the permit application. We understand this will be completed with a hardstanding surface.

NRW provided their most recent comment on the development proposal on the 17th August 2023, highlighting their continued concern with the application as submitted. However, noting that the concerns can be overcome by attaching conditions to the planning permission granted. The conditions are set out as below:

Condition 1 - Long Term Monitoring Plan

Prior to the operation of the development a long-term monitoring plan for water quality shall be submitted and approved in writing by the Local Planning Authority. The long-term monitoring plan should include:

- Details of the methods and triggers for action to be undertaken including water quality sampling parameters;
- Timescales for long term monitoring;
- Timescales for submission of monitoring reports to the LPA, e.g., annually;
- Details of any necessary contingency and remedial actions and timescales for actions;
- Details confirming that the contingency and remedial actions have been carried out.

The monitoring plan shall be carried out in accordance with the approved details, within the agreed timescales.

Condition 2 – Construction Environmental Management Plan

NRW previously requested a CEMP to be conditioned. In their previous response – 09/05/2023 NRW noted the submission of a CEMO and advised the CEMP needs to be

updated to reflect more appropriate measures to remove plastics from the surface water flow at source. NRW note that an updated CEMP has not been provided and as such continue to request a CEMP be a condition on any permission granted.

CCBC – Drainage

CCBC provided initial comment to the planning application on 11th July 2022, indicating a request for planning condition to be assigned to the proposed development as follows:

"Prior to the commencement of works on site a scheme of land and surface water drainage (inclusive of watercourses) within the site shall be submitted to and agreed in writing by the Local Planning Authority. All works that form part of the agreed scheme shall be carried out before any part of the development to which it relates is occupied".

CCBC – Drainage provided their most recent comment on the proposed development on 17th July 2023, highlighting several concerns regarding the development, including:

1. The applicant has indicated the disposal of surface water via sustainable drainage system; and has submitted limited information to consider the viability of this method of disposal of surface water. We recommend the SAB Process is started as soon as possible.

2. The applicant has indicated the disposal of surface water via watercourse; NRW have raised concerns with the proposed development in terms of its SSSI status and the Protection of Waters.

3. The site is situated within an area susceptible to groundwater flooding.

4. It is noted that the proposed site is situated within Flood Zones 2 and 3 for Surface water and small watercourses, as identified within the NRW Flood Map for Planning.

CCBC recommend the Planning Authority consult Natural Resources Wales for their comments. The applicant may be required to submit a Flood Consequence Assessment (FCA) which examines the likely mechanisms that cause flooding, and the consequences on the development of the flooding, must be undertaken which is appropriate to the size and scale of the proposed development.

CCBC – Environmental Health

CCBC – Environmental Health provided comment on the proposed development on 8th July 2022, and raised no objections in principle with the application, but recommended the adoption of the following planning conditions:

CON02 Contamination - soil import testing Before any soils or hardcore are brought on to site a scheme for its importation and testing for contamination, shall be submitted to and agreed in writing with the Local Planning Authority. The development shall thereafter be carried out in accordance with the approved scheme. REASON: To prevent contamination of the application site in the interests of public health.

The letter also requested conditions in regard to dust suppression and noise suppression, however, assessment of these do not form part of the scope of the Hydrogeo works.

Merthyr County Borough Council.

Merthyr Country Borough council have raised no objections in regard to the planning application within their most recent consultee correspondence letter dated 24th April 2023.

Caerphilly County Borough Council (CBCC) Planning Decision Notice

On the 9th November 2023, CBCC provided correspondence indicating the permission for the development subject to a number of conditions. The conditions relevant to this risk assessment are included below:

- Prior to the operation of the development (either the concrete surface yard being brought into use or any offsite discharge from the Lagoons whichever is the earlier) a long-term monitoring plan for water quality shall have first been submitted to and approved in writing by the Local Planning Authority. The long-term monitoring plan should include:
- 1) Details of the methods and triggers for action to be undertaken including water quality sampling parameters.
- 2) Timescales for the long-term monitoring.
- 3) Timescales for submission of monitoring reports to the Local Planning Authority (e.g., annually).
- 4) Details of any necessary contingency and remedial actions and timescales for actions.
- 5) Details confirming that the contingency and remedial actions have been carried out. The monitoring plan shall be carried out in accordance with the approved details, within the agreed timescales.

- Before any soils or hardcore that do not fall within the green category set out in Table 2 of the WLGA document 'Requirements for the Chemical Testing of Imported Materials for Various End Uses and Validation of Cover Systems 2013'

are brought on to site, a scheme for their importation and testing for contamination shall be submitted to and agreed in writing with the Local Planning Authority. The development shall thereafter be carried out in accordance with the approved scheme.

A number of other planning conditions are assigned to the development which are covered by a number of other reports formulated as part of the planning application document package.

1.3 Report Aims and Objectives

The scope of work for this study comprises:

- Review existing Site data, reports and information provided by the client team;
- Review of data available in the public domain, including geological data, borehole data, hydrological and hydrogeological data;
- Summarise any previous intrusive site investigation works progressed within the vicinity of the proposed development;
- Detailed Qualitative Risk Assessment in relation to the proposed development and the identified sensitive environmental receptors;
- Recommendations on what (if any) mitigation measures are required for the development.

1.4 Data Sources & Guidance

In addition to the existing available site reports and data this risk assessment has drawn upon the following sources of information:

- British Geological Survey (BGS) online resources;
- 1:10560 Scale Geological sheet ST 19 NW;
- Data Map Wales;
- Hydrogeological Impact Appraisal (Hydrogeo May 2020);
- Hydrogeological Risk Assessment (Hydrogeo July 2021);
- Coal Mining Risk Assessment (Blandford Consulting March 2022);

- Construction Environmental Management Plan (CEMP) (JPCE Limited, April 2023);
- Construction Phase Drainage Scheme (JPCE Ltd, June 2022);
- Operational Drainage Scheme (JPCE Ltd, June 2022);
- Microplastic Management (Bryn Group, August 2023).

2 Site Geo-Environmental Setting

2.1 Site Location

The MRF Recycling Facility is located at Gelliargwellt Uchaf Farm, approximately 1km southwest of Gelligaer, centered approximately on National Grid Reference: 312410, 196595, and is accessed off the B4254 which runs to the north of the Site.

The 'Proposed Development' forms part of the wider Bryn Recycling Ltd Site. The Proposed Development area location is shown on Figure 2-2 outlined in red, with the wider Bryn Group of company's land ownership boundary highlighted in yellow.

The 'Proposed Development Area' is referred to as 'the Site' for the ease of reporting.

Figure 2-1 - Site location.

Figure 2-2 – Aerial Image of the Development Site Area

2.2 Proposed Development

The proposed development as shown in Figure 2 3 consists of a storage area for soils produced as part of the recycling process. The new surface will be concreted which will be laid to designed falls, thus controlling surface water run-off from the extension area. The surface water run-off will be collected in a proposed attenuation pond, prior to being directed to a series of 3 lagoons to the west, at the bottom of the newly formed slope.

Temporary works associated with the proposed development comprise, but not be limited to;

- Silt fence establishment along the south-western field margin, 3m from the existing bank of the watercourse;
- Lagoon formation, to 2m – 2.5m depth, with interconnection by a shallow stone filled ditch;
- Lagoon access track;
- Temporary ditch at the toe of the embankment to collect and divert run-off;
- Groundwater seepages will be collected and diverted to this ditch;

The proposals do not increase the throughput currently processed at the Site, or alter the type of soil processed, but rather enable the processing to be undertaken in a more efficient manner.

2.3 Proposed Waste Recovery Plan

Details of the Waste Recovery Plan and Waste Acceptance Procedure for the proposed development have been covered in detail within the Walker Resource Management (WRM Ltd) Waste Acceptance Procedure Report, and the WRM Ltd Waste Recovery Plan.

A bespoke environmental permit is required for the proposed development works as more than 60,000m^3 of material is needed for the formation of slopes and the visual screening bund. The Waste Recovery Plan (WRP) has been produced in line with the Natural Resources Wales (NRW) Guidance.

Bryn Recycling propose to recover approximately 420,000m^3 of inert materials for the proposed development. An additional 3000 tonnes of non-waste (PAS 100 accredited compost) will be used as a top layer on the screening bund to provide a growing and planting medium.

Materials to be used within the proposed development are wastes that have been brought to site directly by small landscaping contractors or utility companies via the MRF. These wastes will not contain any hazardous materials. Table 2-1below presents the waste material types that are to be used within the proposed development.

Table 2-1 Waste Types to be Used in the Proposed Development

01 Waste resulting from exploration, mining, quarrying and physical and chemical treatment of minerals	
01 01	wastes from mineral excavation
01 01 02	Wastes from mineral non-metalliferous excavation
01 04	wastes from physical and chemical processing of non-metalliferous minerals
01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 06
01 04 09	Waste sand and clays

02 Waste from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing	
02 04	wastes from sugar processing
02 04 01	Soil from cleaning and washing beet
18 Construction Waste	
17 01	concrete, bricks, tiles and ceramics
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 03	bituminous mixtures
17 03 02	Bituminous mixtures other than those mentioned in 17 03 01[1]
17 05	soil stones and dredging spoil
17 05 04	Soil and stones other than those mentioned in 17 05 03[2]
19 Wastes from waste management facilities	
19 12	wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 05	Glass
19 12 09	Minerals (for example sand, stones) only
19 12 12	Other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11

20 MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS	
20 02	separately collected fractions (except 15 01)
20 02 02	Soil and stones

Figure 2-4 presents the existing site topographic levels, as well as the proposed topographic levels following the placement and re-profiling works associated with the proposed development.

The strict waste acceptance procedure which makes up part of the proposed environmental management system will ensure that no surplus waste materials are brought onto site. Weekly review of calculations will be performed to determine the total amount of waste brought onto the Site. The waste acceptance procedures will include robust waste characterisation and testing procedures. No wastes will be accepted from contaminated sites, and only wastes determined as suitable for use for the intended purpose will be imported.

Additional detail relating to waste characterisation and acceptance is included within the WRM Waste Recovery Plan, which is included as part of the Waste Recovery Permit supporting documents.

Figure 2-3 Proposed Development Plan

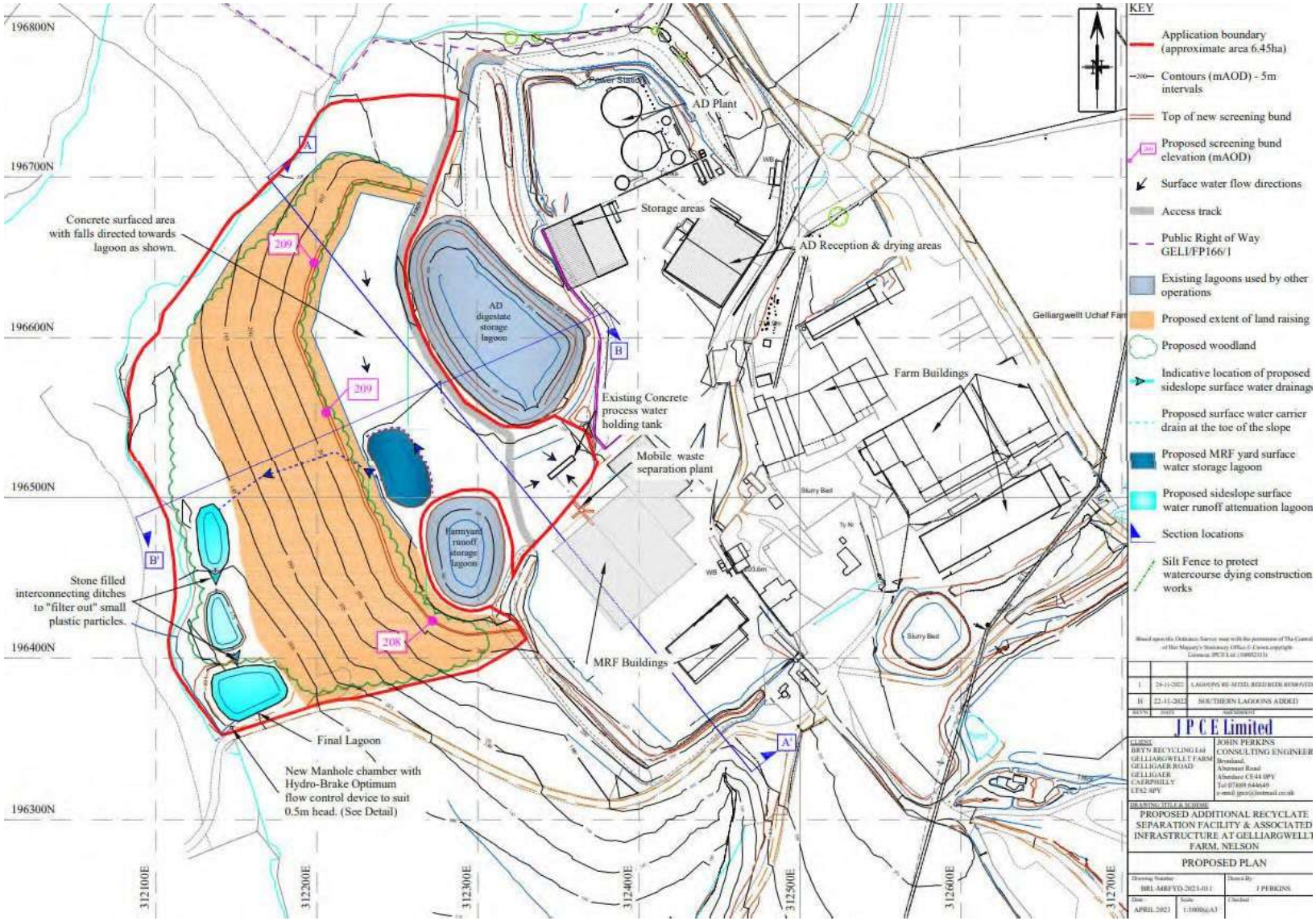
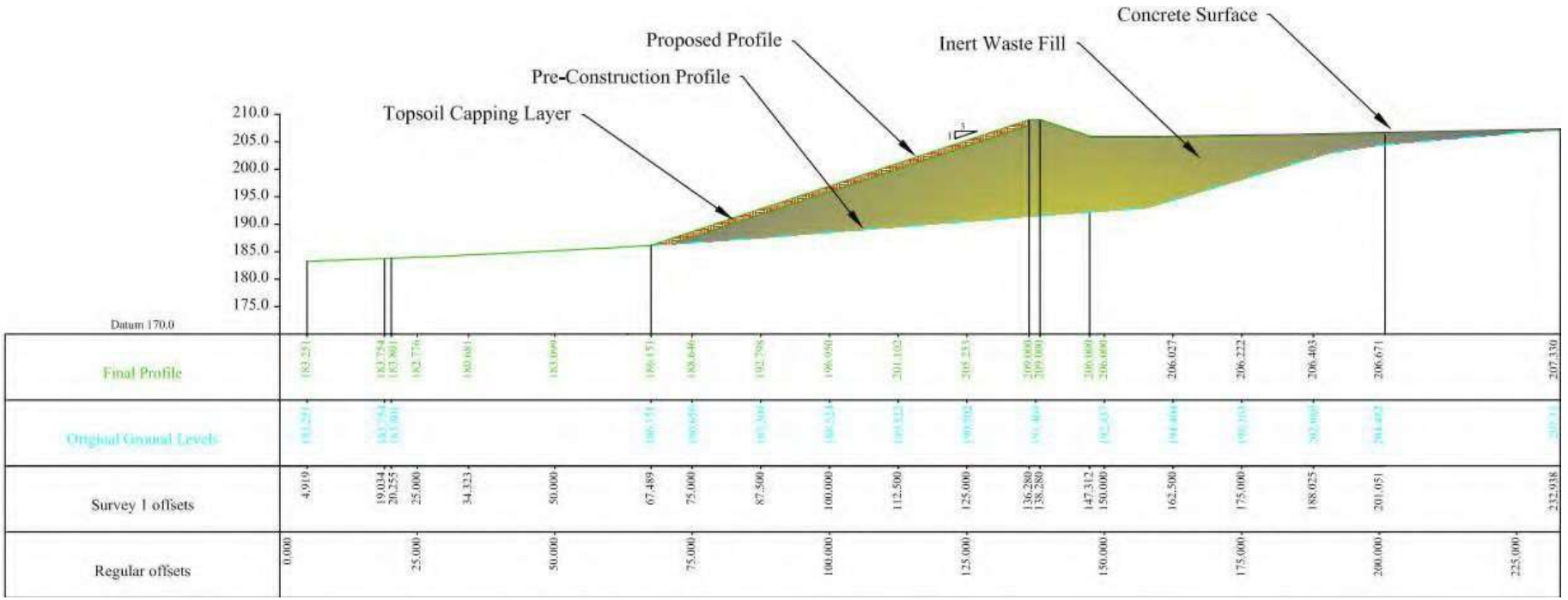


Figure 2-4 Cross Section Showing Existing and Proposed Profiles (figure provided by JPCE LTD)



2.4 Hydrology

Surface Water Features

The closest main primary water bodies to the Site are the River Taff located approximately 3.2 km to the west; and the River Rhymney located approximately 2.5km to the east. The Nant Caeach and the Nant Cylla are two smaller water bodies that are tributaries to the River Taff, and the River Rhymney, and located 1.5km to the west and east respectively.

There are several closer mapped surface water features that enclose the proposed development site, as shown in Figure 2-5. These watercourses are mapped on Ordnance Survey mapping and are indicated as emerging as springs up topographic gradient of the site (Stream 1 and Stream 6). These features then flow south, eventually draining into Nelson Bog SSSI. The spring sourced surface water streams are believed to issue at the interface between the Grovesend Formation (sandstone) and the underlying Grovesend formation (mudstone, siltstone and sandstone).

Figure 2-5 – Aerial image showing proposed development site and bordering surface water features

A number of other surface water features are present within the vicinity of the proposed development site, as shown in Drawing 3. Several of these surface water features, including Stream 2 (southeast of the proposed development), and Streams 3 and 4 (further southeast) are currently monitored as part of the on-going groundwater abstraction license for Bryn Quarry.

SW UP, SW Down SW01 and SW02 are surface water monitoring points that have been

installed within the surrounding streams to monitor the flow rates. The existing surface water monitoring positions are identified on Drawing 3.

Most of the natural surface water run-off across the proposed development site area would predominantly flow south, south-west, following the topographic profile of the site and surrounding area. At present the surface water run-off from the development site area enters into the existing streams along the south-eastern and western boundaries of the Site, with some amount of infiltration into the shallow soils.

Surface water features within the immediate surrounding area eventually drain to the southeast of the Site toward Nelson Bog SSSI.

Water Framework Directive 2015

The aim of the Water Framework Directive (WFD) is to ensure all surface water and groundwater bodies are of good chemical and ecological status. The NRW Water Framework Directive Cycle 2 Rivers and waterbodies online interactive viewer indicates the following designations for the Site:

- The Site is located within the Water Framework Directive (WFD) River Severn River Basin Management Plan area
- The Site is located within the Southeast Valleys WFD River Waterbody Catchment, which is itself located within the Southeast Wales Operational Catchment.
- The Site is not located within a Drinking Water Protected Area for river catchments; the closest area to the Site is the Rhymney River (ID GB109057033130) located 4.5km northeast.

Catchment Abstraction Management Strategy

The Site is located within the Southeast Valleys Catchment Abstraction Management Strategy (CAMS) area.

Decisions upon new surface water abstractions within the CAMS area which the Site is located is dictated by assessment point AP4 described as “River Rhymney at Caerphilly, including tributary catchments such as the Nant Bargoed Rhymni and Nant Cylla”, approximately 9km south of the Site.

The local surface water resource availability within the catchment is defined as water available for licensing for flow conditions Q30; Q50 and Q70; and restricted water available for licensing at Q95 flow conditions.

2.5 Geology

The geological background of the site is described as indicated from the British Geological Survey (BGS) 1:50,000 scale Sheet 249 Newport, and the BGS GeoIndex Interactive Portal. A geological plan of the site area, including faults and coal seams local to the Site, using available BGS 1:50,000 data is presented in Drawing 2.

Superficial geology

The BGS Sheet map indicates that the Site is not underlain by any mapped superficial deposits. The closest superficial deposits consist of peat deposits, covering the wider land ownership area to the east / northeast of the Site, and Devensian glaciaofluvial deposits to the southwest of the Site.

Bedrock geology

The geology of this site area comprises the Grovesend Formation, formally known as the Supra- Pennant Formation, and is the youngest unit found in the South Wales and Forest of Dean coalfields. The BGS lexicon describes the Formation as "*Predominantly argillaceous, comprising mudstones and siltstones, with well-developed coals; minor lithic ("Pennant") sandstones; locally developed red mudstones in the type area".*

The Grovesend formation in the vicinity of the site is depicted to comprise of sandstone on the site and mudstone, siltstone and sandstone to the southwest. BGS mapping indicates that the wider Site area is also underlain by sandstones of the Grovesend Formation.

The BGS map sheet also indicates the NW to SE trending Gelligaer Fault runs through the centre of the proposed development site. The map sheet indicates that the downthrown side of the fault is to the southwest. However, no indication is made in regard to the extent of the downthrow of the fault.

2.6 Hydrogeology

Aquifer Classification

The area of the proposed extension is underlain by the Grovesend Formation which is classified by the Environment Agency as a Secondary-A Aquifer. A secondary aquifer is described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The sandstone is likely to exist as a local aquifer, with groundwater flowing predominantly along fissures and fractures in the rock. The mudstone and siltstone layers in the Formation are likely to limit groundwater flow and recharge due to the low permeability of these layers. Mudstone will weather to clay in the upper part of the strata.

Water Framework Directive

The Site is located within the Water Framework Directive Cycle 2 (WFD) Groundwater body: Southeast Valleys Carboniferous Coal Measures (GB40902G201900). The groundwater body is listed as having a “Poor” overall status, with a poor chemical status, due to a failure for “chemical dependent surface water body status”. No 2021 objectives have been set for the betterment of the groundwater body.

Source Protection Zone

The site is not within a designated source protection zone (SPZ). The closest licensed groundwater abstraction is located within the wider ownership of Bryn Quarry, and relates to the abstraction of groundwater for quarrying activities to the east / southeast of this proposed development area. There are no other licensed groundwater abstractions within a 2km radius of the Site.

Site Hydrogeology

It is believed that the groundwater recharge occurs at the topographical high (~300mAOD) approximately 1.8km to the northwest, where the Grovesend Formation sandstone is exposed. Additional recharge is also expected, albeit to a lesser extent, through the fault zones that strike northwest-southeast proximal to the south of the Site.

The presence of several springs at a lower level to the south of the site indicates that groundwater in the sandstone aquifer is discharging to ground surface at the interface between the sandstone and the underlying siltstone / mudstone layers of the Grovesend Formation.

2.7 Designated Sites of Ecological Importance

An Ecological Assessment has been progressed by BSG Ecology Ltd (dated April 2022) to inform pre-application consultation for the proposed development. The assessment considers all ecological features across the proposed development site and within the immediate site vicinity, including flora and fauna, as well as any designated sites.

It is recommended that the BSG Ecology Ecological Assessment is reviewed in conjunction with this section of the report as it covers the ecology across the site in greater details than the Hydrogeo desk-based review.

As part of the Hydrogeo desk study, a number of ecological features across the site and in the immediate site vicinity have been identified, and are summarised as follows.

Sites of Special Scientific Interest

Nelson Bog, part of the Penallta Country Park, located approximately 400m to the south of the Site is a designated ecological Site of Special Scientific Interest (SSSI). Nelson Bog was designated as a SSSI (ref. id 0471) in 1989 and is approximately 27.7 hectares in size. Most of the Nelson Bog SSSI is spread northwest- southeast along the base of the valley, approximately 400m south of the Site; while the portion of the SSSI closest to the site is located on a topographical gradient, from ~180mAOD, down to the valley base at ~148mAOD.

The SSSI is described, in documentation published by the Countryside Council for Wales, now Natural Resources Wales, as "*a valley mire receiving relatively base-poor waters from the underlying Coal Measures rocks and adjoining wet pastures associated with marginal hill farming activities and upland hazel/sessile oak woodland*".

It is believed that the portion of the SSSI that is closest to the Site, from approximately 400m to 650m south of the Site, and located on a gradient from ~180mAOD to 148mAOD, is the "upland hazel/sessile oak woodland"; while the "valley mire" is located from approximately 650m south of the Site, at which point the land flattens out at 148mAOD.

There is no known Condition Survey on Nelson Bog by Natural Resources Wales detailing the status and general condition of the SSSI at any point since its designation in 1989. A request has made to Natural Resources Wales to provide any additional information with regards to the condition and/or layout of the Nelson Bog SSSI.

Nelson Bog SSSI is dependent upon the maintenance of high water levels and is fed by a series of surface water features that run from the north to northeast and spread into the bog

The “upland hazel/sessile oak woodland” portion of the Nelson Bog SSSI is believed to be fed by two springs which emerge as surface water streams (Streams 3 & 4, Drawing 3). While the “Valley Mire” portion of Nelson Bog SSSI is believed to be fed by Streams 1 & 2 which are located closer to the proposed development site. Nelson Bog SSSI is also fed by groundwaters that discharge from a former coal mining adit (SW4) located approximately 700m southeast of the proposed development site.

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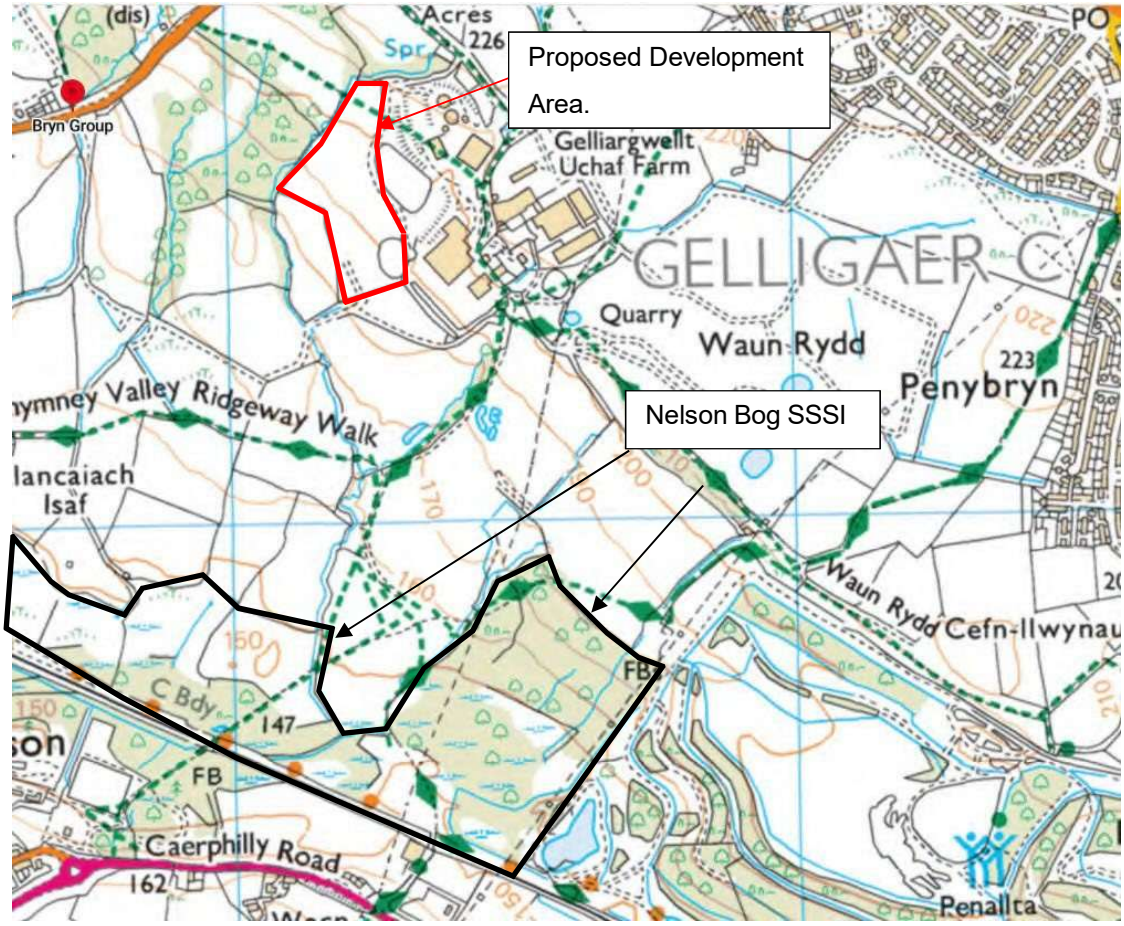
Additionally, Ordnance Survey mapping and available 2m LIDAR data, provided by Natural Resources Wales, also indicate several additional surface water features in or flowing into/along Nelson Bog SSSI, as shown in Figure 2-5.

Figure 2-6 - Water features (Blue Lines) indicated on OS mapping or LIDAR data feeding Nelson Bog SSSI.



Site of Importance for Nature Conservation (SINC)

The area immediately to the north of the existing quarry bund is an adopted Site of Importance for Nature Conservation (SINC) and is known as Waun Rhydd SINC (ref.id NH3.53). It is a local, non-statutory designated site that is approximately 10.2 hectares in size. Topographically, the SINC is at its highest (221mAOD) towards the west, and the southern boundary, of the adopted site, with the gradient of the land falling toward the northeast where it reached 212mAOD.

The Caerphilly Borough Council Local Development Plan, dated 2010, describes the Waun Rhydd's primary qualifying features for SINC status as: "*degraded marshy grassland (bog), which still retains at least 12 marshy grassland indicator species*"; as well as secondary qualifying features of "*semi-improved acid grassland; and scrub*".

The ground conditions beneath the Waun Rhydd SINC comprises of peat overlying clay, which in turn overlies the sandstone bedrock. Surface water run-off across the SINC is retained by the peat before discharging predominantly to the northeast to an unnamed stream which flows along Anuerin Bevan Avenue away from the Site and ultimately into the Nant Cylla. The Nant Cylla is a tributary of the River Rhymney which flows generally north to south in this area. A portion of the surface water run-off flows to the southwest.

It should be noted that western limb of the Waun Rhydd SINC is located outside of the Bryn Group site ownership and appears to be used as agricultural and open pastoral land for free-roaming livestock. In addition, several storage containers, disused vehicles and scrap metal were noted, as seen in Figure 2-6.

All Ecological and sensitive site locations within the vicinity of the proposed development, including Nelson Bog SSSI are shown on Drawing 3..

Figure 2-6 - View northwards across western limb of Waun Rhydd outside of client site ownership. As observed on 7th February 2020.

3 Review of External Reports and Planning Documents

3.1 Introduction

This section provides a summary of the reports and additional planning documents associated with the proposed development that are relevant to this risk assessment. All documents reviewed have either been provided to Hydrogeo by the client team or accessed on the CCBC Online Planning Portal.

The reports / documents reviewed and summarised in the following report sections include:

- Coal Mining Risk Assessment (Blandford Consulting March 2022);
- Construction Environmental Management Plan (CEMP) (JPCE Limited, April 2023);
- Construction Phase Drainage Scheme (JPCE Ltd, June 2022);
- Operational Drainage Scheme (JPCE Ltd, June 2022);
- Microplastic Management (Bryn Group, August 2023).

3.2 Coal Mining Risk Assessment

The Coal Mining Risk Assessment progressed by Blandford Consulting indicates the presence of a large fault (Gelligaer Fault) passing through the Site.

This fault intersects the Site and results in coal seams underlying the Site at varying depths to the east and western sides of the fault. The report notes that the Big Rider Coal Seam is present on the western side of the fault at shallow depths, but not on the eastern side. The shallowest coal seam on the eastern side of the fault is the Mynyddislwyn Coal Seam which is estimated by Blandford Consulting to be approximately 30mbgl.

The report indicates that the big Rider Coal Seam has been worked beneath the Site using open cast mining methods, and consequently any historic workings within the seam removed. The Mynyddislwyn Coal Seam has been mined historically at several collieries in the area, however there are no records relating to the working of the seam beneath the Site.

The Coal Mining Risk Assessment concludes that there is no risk to the proposed MRF development from the underlying coal seams, and the coal mine gas risk is also low.

3.3 Construction Environmental Management Plan (CEMP)

The JPCE Ltd CEMP establishes the controls required to protect the identified sensitive environmental receptors from potential pollution arising due to the proposed construction works.

The JPCE CEMP covers temporary works requirements associated with the development, the permanent works for the development, as well as on-going and future monitoring and maintenance.

Temporary work requirements during the construction works phase include;

- Silt fence construction along south-western field margin approximately 3m from the existing bank of the watercourse;

- Lagoon formation and connection via shallow ditch. Ditch will be stone filled;
- Access track around lagoons;
- Temporary ditch at toe of proposed embankment.;
- Bases of lagoons lined with gravel;
- Groundwater seepages will be diverted to the ditch;
- Piping from lagoon to allow discharge to the nearby watercourse.

All temporary works are shown in detail within the JPCE Ltd CEMP. Permanent works associated with the proposed development include;

- Grass seeding and tree planting of areas following completion of levels;
- Lagoon on plateau to be excavated and piped;
- Manhole with hydro-brake control device installed;
- Following proper operation of the drainage system, and vegetation is established, the toe ditch and silt fencing may be removed.

The CEMP sets out on-going maintenance requirements across the lifecycle of the proposed development, alongside other mitigation measures and monitoring requirements, detailed in Table 4-1.

3.4 Micro-Plastics Management at Bryn Recycling

Bryn Group have produced a micro-plastic management document for the operations at Bryn Recycling. The report sets out and identifies the potential sources of micro-plastics form site-based operations.

The report indicates that the primary source of micro-plastics is manufactured plastics which are processed at Bryn Recycling, including the recycling of textiles, windblown plastics, food packaging, and fragmentation of larger plastic items. The management report notes that secondary microplastics present a higher risk.

The report details site water collection and discharge operations which are screened by filters on the water outlet, with backup filter system to be installed. The mechanical filters include ceramic, natural fibre filter, synthetic fibre filter and a metal filter.

The report concludes with recommendations, including the inclusion of a fall-back filter system, with details of ongoing inspection, monitoring and maintenance of the filter system operations.

The report notes that where microplastics are identified within the lagoon systems, these waters can be removed for external treatment by a third-party suitably qualified waste carrier, to a suitable wastewater treatment plant.

3.5 Stability Risk Assessment

JPCE Ltd have prepared a Stability Risk Assessment Report for Bryn Recycling for the proposed development and to support the Waste Recovery Plan (WRP).

The conceptual stability site model indicates that the materials storage yard will be constructed on an area of historic opencast coal mining, where the Mynyddislwyn seam was excavated. The Client informed JPCE that this previous open cast area was backfilled using compacted clay rich soils.

The report indicates three major components of the conceptual stability site model, which includes the underlying sandstone bedrock, the basal subgrade and the imported inert waste materials.

The stability risk assessment considers the groundwater table beneath the proposed development site is either below the level of the previous opencast backfilling or that the backfilled opencast backfilling material is confining the groundwater. The assessment has therefore taken the groundwater level at the interface between the imported and existing soils.

The Stability Risk Assessment concludes that the assessment shows satisfactory factors of safety at all stages of the site development, and it is considered to take annual topographical surveys to identify any areas of settlement or stability.

4 Hydrogeological Conceptual Site Model

The following section sets out a conceptual site model (CSM) for evaluation of the risk to sensitive (water environment) receptors which qualitatively describes the potential contaminant sources present, receptors upon which contaminants could have an impact and pathways that may exist to allow contaminants to impact upon the identified groundwater receptors. The CSM is based on the future commercial end-use of the proposed development as an extension to the existing materials storage associated with the MRF.

A guide to contaminated land risk assessment is set out in CIRIA C552. The CSM has been developed using current UK guidelines including CIRIA C552 and Environment Agency Land Contamination Risk Management (LCRM) and developed using the information provided in desk-based studies and site investigation, as described in the previous sections.

Following the procedures of LCRM, to assess the potential impact of any contamination identified at the Site on receptors a risk assessment approach has been used. For a risk to be present at the Site three components must exist:

- A **Source**; a contaminant or pollutant that is in, on or under the land and that has the potential to cause harm or pollution;
- A **Receptor** must be present; something that could be adversely affected by a contaminant, for example a person, controlled waters, an organism, an ecosystem, or Part 2A receptors such as buildings, crops or animals;
- There must be a **Pathway**; a route by which a receptor is or could be affected by a contaminant (potential contaminant linkage).

The assessment has assumed peak enabling and construction, as well as peak operation at the proposed development to allow for the assessment of the ‘Worst Case’ scenario. It is unlikely that peak operation at the proposed development will occur for prolonged periods of time, and peak construction is also limited.

The Conceptual Site Model (CSM) is presented within Table 4-1.

The Conceptual Site Model and Hydrogeological Risk Assessment has been progressed in line with Natural Resources Wales (NRW) and GOV.UK Guidance, ‘Carrying Out a Risk

Assessment for a Bespoke Permit to Deposit Waste for Recovery' and 'Groundwater Risk Assessment for Your Environmental Permit'.

4.1 Sources of Risk

The sources of risk are presented for both the enabling / construction works phases of the proposed development, as well as the operational phase of the proposed development. The sources for both scenarios include:

Enabling / Construction Phase

- Site preparation works, including excavation of existing soils and importation of soils to form site levels and slope profiling works;
- Use of plant and other site vehicles, with associated re-fuelling activities during enabling and construction works phases, including storage;
- Excavation of lagoons to 2mbgl – 2.5mbgl;
- Chemical condition of existing soils underlying the Site;

Operational Phase

- Storage of soils, with potential for waste materials;
- Increased surface water run-off due to increased low permeability hardstanding area;
- Surface water quality decline, potentially including conductivity and suspended solids;
- Increased flows within surface water features, resulting in an increased volume of water entering Nelson Bog SSSI;

Source Term: Inert Waste

To allow for the re-profiling works associated with the proposed development, the Client Team are looking to import inert materials to site under a waste recovery permit. The proposed imported materials are likely to consist of materials as classified in Table 2-1.

Inert wastes are already proposed to be used for the infilling of the quarry. The proposal therefore includes the diversion of some of this imported inert material for use within re-profiling works, and formation of the proposed screening bund.

Any incidental rainfall during the placement of this inert material will infiltrate through the material and generate a leachate. However, due to the proposed inert nature of the importation materials, it is considered unlikely that water coming into contact with this

material at the site will generate high concentrations of pollutants as part of any leachate generated.

As highlighted in red in Table 4-1, there are determinants tested as part of the Waste Acceptance Criteria (WAC) test suite which have inert waste screening limits that are comparably higher than the relevant UK-DWS and/or EQS freshwater screening values.

Table 4-1 Waste Acceptance Criteria and UK DWS / EQS

Determinant	Inert Landfill Waste Acceptance Criteria Limits Leachate (mg/kg)	Inert Landfill Waste Acceptance Criteria Limit Solid (mg/kg)	Equivalent Leachability (mg/kg)	UK-DWS (mg/l)	EQS (mg/l)
Arsenic	0.5		0.05	0.01	0.05**
Barium	20		2	-	-
Cadmium	0.04		0.004	0.005	0.00025***
Chromium	0.5		0.05	0.05	0.0047**
Copper	2		0.2	2	0.001**
Mercury	0.01		0.001	0.001	0.00007
Molybdenum	0.5		0.05	-	-
Nickel	0.4		0.04	0.02	0.004**
Lead	0.5		0.05	0.01	0.0012
Antimony	0.06		0.006	0.005	-
Selenium	0.1		0.01	0.01	-
Zinc	4		0.4	-	0.0123**
Chloride	800		80	250	250
Fluoride	10		1	1.5	5

Determinant	Inert Landfill Waste Acceptance Criteria Limits Leachate (mg/kg)	Inert Landfill Waste Acceptance Criteria Limit Solid (mg/kg)	Equivalent Leachability (mg/kg)	UK-DWS (mg/l)	EQS (mg/l)
Sulphate (soluble)	1000		100	250	400**
Total Dissolved Solids	4000		400	-	-
Total Monohydric Phenols	1		0.1	-	0.0077**
Dissolved Organic Carbon	500		50	-	-
Total Organic Carbon		3%		-	-
Sum of BTEX		6		0.001[1]	0.01[1]
Sum of 7 PCBs		1		-	-
Mineral Oil		500		-	-
Sum of PAHs		100		0.001[2]	

*Leachate testing at Liquid to Solid ratio of 10l/kg, as per BS EN 12457-3; 1Benzene used as marker; 2Sum of 4; **EQS Annual Average value; *** EQS Annual Average value where water hardness >250mg/l.

4.2 Pathways

Pathways for potential contaminants and risk sources to impact upon the identified sensitive receptors include the following during both the enabling/construction and operational phases:

- Short circuit migration pathways (drainage features), sub-surface lagoon excavations (2mbgl – 2.5mbgl);
- Surface water runoff;
- Leachate generation from soil stockpiles (lateral migration with surface runoff)
- Limited vertical migration (restricted by concrete hardstanding surfacing);

Enabling/Construction Phase Description

The enabling and construction phases will include an initial site clearance followed by the re-contouring of slopes to allow for a 1:3 fall (currently a 1 in 8 fall). The formed slope will be planted as per the landscape architectural team. The plateaued area at the top of the formed slope will then be concreted and formed to allow surface waters to fall into the temporary drainage infrastructure. A new surface water lagoon is to be excavated at the plateau to allow for the settlement of suspended solids, prior to controlled outfall.

Operational Phase Description

The operational phase includes the storage of materials to be processed, and that are processed at the on-site Materials Recycling Facility (MRF) across the concreted plateau area.

4.3 Environmental Receptors

Following review of previous reporting across the wider Bryn Recycling Ltd site area, as well as associated planning documents and data within the public domain, the following receptors have been identified which are potentially at risk from the proposed development works and operational phase of the development:

- Surface water features (Spring issues at surface, streams etc);
- Shallow groundwater
- Nelson Bog SSSI (and associated ecology).

4.4 Summary

The Conceptual Site Model (CSM) is summarised as follows:

Sources – Enabling and Construction

- **S1:** Plant and machinery, including storage of fuels and re-fuelling activities;
- **S2:** Site preparation works, including excavation of existing soils (existing chemical condition).
- **S3:** Sub-surface excavation for lagoon construction (2mbgl – 2.5mbgl).
- **S4:** Use of imported inert waste materials in re-profiling works.

Sources – Operational Phase

- **S1:** Storage of soils, with potential for waste materials;
- **S2:** Increased surface water run-off due to increased low permeability hardstanding area;

- **S3:** Surface water quality decline, potentially including conductivity and suspended solids;
- **S4:** Increased flows within surface water features, resulting in an increased volume of water entering Nelson Bog SSSI;
- **S5:** Use of imported inert waste materials in re-profiling works.

Pathways

- **P1:** Surface water runoff;
- **P2:** Short circuit migration pathways;
- **P3:** Leachate generation;
- **P4:** Limited vertical migration.

Receptor

- **R1:** Surface water features (Spring issues at surface, streams etc);
- **R2:** Shallow groundwater;
- **R3**: Nelson Bog SSSI (and associated ecology).

Table 4-2 - Conceptual Site Model.

Source	Pathway	Receptor	Risk Rating	Justification and Mitigation Measures
Enabling and Construction Phase				
S1: Plant and machinery, including storage of fuels and re-fuelling activities	**P1:** Surface water runoff; **P2:** Short circuit migration pathways; **P4:** Limited vertical migration.	**R1:** Surface water features (Spring issues at surface, streams etc); **R2:** Shallow groundwater **R3**: Nelson Bog SSSI (and associated ecology).	Low	Mitigation measures to address the potential risks associated with the use of plant machinery, as well as the refuelling and storage of fuels on-site is to be addressed in an updated Construction Environmental Management Plan, once an enabling / construction works contractor has been appointed. A fuel / oil management plan will be implemented, which should incorporate, but not restricted to the following: • Mobile bowsers, tanks and drums stored in a secure, impermeable storage area, away from surface water features, drains and other trenches / ditches in the construction compounds. • Fuel containers stored within a secondary containment system, e.g., bund for static tanks or a drip tray for mobile stores in the construction compounds. • Ancillary equipment such as hoses, pipes contained within the bund. • Taps, nozzles or valves fitted with a lock system. • Fuel and oil stores including tanks and drums regularly inspected for leaks and signs of damage. • Designated trained operators authorised to refuel plant on site, and emergency spill kits present for all refuelling events. • Procedures and contingency plans set up to deal with emergency accidents or spills. • Emergency spill kit with oil boom, absorbers, etc kept on site in the event of an accidental spill.

Source	Pathway	Receptor	Risk Rating	Justification and Mitigation Measures
S2: Site preparation works, including excavation of existing soils (existing chemical condition), and importation of materials to form site levels and profiles	**P1:** Surface water runoff; **P2:** Short circuit migration pathways; **P3:** Leachate generation; **P4:** Limited vertical migration.	**R1:** Surface water features (Spring issues at surface, streams etc); **R2:** Shallow groundwater **R3**: Nelson Bog SSSI (and associated ecology).	Moderate	Any proposed imported materials for the purpose of construction are to be proven clean naturally occurring materials verified prior to the importation and use on-site. It is recommended that the frequency of testing on imported natural materials is progressed at a rate of 1 / 2 depending on the type of stone utilised, to confirm the inert nature of the material. Materials shall be tested for Standard metals/metalloids (which should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se and, Zn). The soils testing regime shall be agreed with the Local Authority in advance of construction works. It is advised that the Client implement a watching brief strategy with a suitably qualified consultant during any earthworks across the Proposed Development Site. The consultant should be called to attend site in the case that the developer encounters any grossly visually and/or olfactory contaminated soils. Any resulting materials where excavated should be placed on low permeability surfaces or hardstanding where possible, and under cover to limit the potential for leachate generation, and sediment laden waters entering the temporary drainage systems.

Source	Pathway	Receptor	Risk Rating	Justification and Mitigation Measures
S3: Sub-surface excavation for lagoon construction (2mbgl – 2.5mbgl)	**P2:** Short circuit migration pathways; **P4:** Limited vertical migration.	**R2:** Shallow groundwater	Moderate	It is not expected that there will be any significant accumulation of water within the excavations (surface and/or groundwater). However, where water does enter excavations, it should be pumped out to a silt buster / settlement tank (prior to lagoon construction) and eventually discharged to the surface water network following adequate settlement of suspended solids. Lagoon excavations should have a watching brief by a suitably qualified consultant, with the excavations logged and photographed in line with BS5930:2015. Details regarding the excavation process, associated health and safety measures, and the excavation arisings are to be addressed once a construction works contractor has been appointed
S4: Use of imported inert waste materials in re-profiling works.	**P1:** Surface water runoff; **P2:** Short circuit migration pathways; **P3:** Leachate generation; **P4:** Limited vertical migration.	**R1:** Surface water features (Spring issues at surface, streams etc); **R2:** Shallow groundwater **R3**: Nelson Bog SSSI (and associated ecology).	Moderate	The proposed development consists of the re-profiling of the site, and the construction of a visual screening bund. These works are to utilise imported inert waste materials under a bespoke environmental permit with Natural Resources Wales (NRW). Inert waste materials will be imported to the Site and processed at the Bryn Recycling Materials Recycling Facility (MRF). The materials will be sourced from local landscaping contractors and / or utility contractors. Incidental rainfall will likely infiltrate into the profiled inert waste mass. Although inert, the waste mass may still contain leachable contaminants such as heavy metals that conform to waste acceptance criteria but may still pose a risk to the groundwater and surface water environment. A detailed designed surface water drainage system is to be implemented during the construction phase of the development, which will collect, divert and treat any surfaces

Source	Pathway	Receptor	Risk Rating	Justification and Mitigation Measures
				waters and potential leachate generated, prior to controlled discharge to the existing surface water system. Detailed waste acceptance procedures will be in place to minimise the risk that unacceptable waste materials are accepted at the Site, and procedures will be in place for the rejection of non-conforming loads. The waste acceptance procedure will include robust waste characterisation and testing procedures, including initial basic characterisation, compliance testing and on-site verification. An imported 3000 tonnes of non-waste (PAS 100 accredited compost) is to be used as a top layer across the screening bund, this layer will likely consist of low permeability materials, and will therefore limit the infiltration of rain and other surface waters into the underlying inert waste materials, and therefore reducing the volume of potential leachate generation.
Operational Phase				
S1: Storage of soils, with potential for waste materials	**P1:** Surface water runoff; **P2:** Short circuit migration pathways; **P3:** Leachate generation; **P4:** Limited vertical migration.	**R1:** Surface water features (Spring issues at surface, streams etc); **R2:** Shallow groundwater **R3**: Nelson Bog SSSI (and associated ecology).	Moderate	Where possible, materials storage areas should be located as far away as possible from watercourses and other sensitive receptors, as well as any potential short-circuit pathways including manhole covers, drainage and other service channels. Areas should also be secured to minimise the risk from unauthorised access and vandalism. Materials should also be stored under cover to reduce the infiltration of rainwater and subsequent leachate generation which may migrate into the existing surface water network. Secondary containment measures should be implemented across the storage yard area, with containment measures conforming to CIRIA C736 guidance.

Source	Pathway	Receptor	Risk Rating	Justification and Mitigation Measures
				The drainage infrastructure must contain all possible run-off and prevent incompatible wastes encountering each other.
S2: Increased surface water run-off due to increased low permeability hardstanding area	**P1:** Surface water runoff; **P2:** Short circuit migration pathways;	**R1:** Surface water features (Spring issues at surface, streams etc); **R3**: Nelson Bog SSSI (and associated ecology).	Moderate	Surface water features in the vicinity of the Site which drain into Nelson Bog SSSI are currently monitored by the Client. Following review of the associated drainage design documents, the proposed drainage system will consist of an outfall flow restriction device to allow the control of outflows from the lagoon systems into the existing surface water network, and eventually into Nelson Bog SSSI. It is proposed that additional surface water monitoring points are installed downstream of the outfall of the drainage system.
S3: Surface water quality decline, potentially including conductivity and suspended solids	**P1:** Surface water runoff; **P2:** Short circuit migration pathways; **P3:** Leachate generation;	**R1:** Surface water features (Spring issues at surface, streams etc); **R3**: Nelson Bog SSSI (and associated ecology).	Low	The drainage system for the operational phase of the proposed development will incorporate settlement lagoons specifically designed and sized for the proposed development. The settlement lagoons will allow for a period of settlement for suspended solids prior to discharge at a controlled outfall rate, to the existing surface water network . JPCE has indicated that the operator will test the discharge from for ammonia levels monthly, after routine maintenance works or where there is suspicion of contamination. Where there is a suspicion of contamination the management system for the affected drainage element will be followed. If necessary, water samples will be collected by suitably trained personnel with dedicated and sampling equipment. The water samples collected will be analysed at a suitably accredited laboratory. All such actions will be reported to the site manager and recorded in the daily site diary.
S4: Increased flows within surface water features,	**P1:** Surface water runoff;		Moderate	Surface water features in the vicinity of the Site which drain into Nelson Bog SSSI are currently monitored by the Client.

Source	Pathway	Receptor	Risk Rating	Justification and Mitigation Measures
resulting in an increased volume of water entering into Nelson Bog SSSI	**P2:** Short circuit migration pathways;	**R1:** Surface water features (Spring issues at surface, streams etc); **R3**: Nelson Bog SSSI (and associated ecology).		Following review of the associated drainage design documents, the proposed site drainage system will consist of a flow restriction device to allow the control of outflows from the lagoon systems into the existing surface water network, and eventually into Nelson Bog SSSI.
S5: Use of imported inert waste materials in re-profiling works.	**P1:** Surface water runoff; **P2:** Short circuit migration pathways; **P3:** Leachate generation; **P4:** Limited vertical migration.	**R1:** Surface water features (Spring issues at surface, streams etc); **R2:** Shallow groundwater **R3**: Nelson Bog SSSI (and associated ecology).	Moderate	The development consists of the re-profiling of the site, and the construction of a visual screening bund. These works are to utilise imported inert waste materials under a bespoke environmental permit with Natural Resources Wales (NRW). Inert waste materials will be imported to the Site and processed at the Bryn Recycling Materials Recycling Facility (MRF). The materials will be sourced from local landscaping contractors and / or utility contractors. An imported 3000 tonnes of non-waste (PAS 100 accredited compost) is to be used as a top layer across the screening bund, this layer will likely consist of low permeability materials, and will therefore limit the infiltration of rain and other surface waters into the underlying inert waste materials, and therefore reducing the volume of potential leachate generation. The screening bund will also be planted with grass, shrubbery and trees across the operation phase of development, which will further reduce the infiltration of rainwater into the underlying inert waste mass, and provide a means for plant uptake of shallow infiltrated water. A detailed designed operational phase drainage system will be implemented at the site and consist of interceptors, and settlement / attenuation lagoon systems prior to the controlled discharge at the outfall to the existing surface water network. This will allow for any surface water runoff entering the system to undergo primary and secondary treatment through the settlement of suspended solids

5 Conclusions and Recommendations

Hydrogeo Limited (Hydrogeo) was commissioned by Bryn Recycling Ltd to progress a Hydrogeological Risk Assessment to support the extension to the existing Materials Recycling Facility operational area and a bespoke environmental permit for waste recovery at Gelliargwellt Farm, Gelligaer Road, Gelligaer.

This Hydrogeological Risk Assessment has been progressed in line with guidance from Natural Resources Wales (NRW) 'Carrying out a risk assessment for a bespoke permit to deposit waste for recovery', and GOV.UK guidance 'Groundwater risk assessment for your environmental permit'.

A bespoke environmental permit is required for the proposed development works as it is proposed to utilise imported inert waste materials for the re-profiling and construction of a visual screening bund as part of the proposed development. Bryn Recycling are looking to import approximately 420,000m^3 of inert waste materials for use in the development.

A planning application was submitted to Caerphilly County Borough Council (CCBC) on 24th June 2022, and validated by CBCC on 27th June 2022. The application proposal is covered by planning reference 22/0567/FULL, and relates to;

"*Conduct engineering works to provide site drainage, an enhanced landscape bund and areas of hardstanding along with landscaping and associated works for the more efficient storage of recyclable waste".*

This report provides a risk assessment for the proposed development, identifying the potential sources of risk, and the potential pathways in which risks can result in impacts upon identified sensitive environmental receptors.

The Conceptual Site Model (CMS) is summarised as follows:

Sources – Enabling and Construction

- **S1:** Plant and machinery, including storage of fuels and re-fuelling activities;
- **S2:** Site preparation works, including excavation of existing soils (existing chemical condition), and importation of materials to form site levels and profiles;
- **S3:** Sub-surface excavation for lagoon construction (2mbgl – 2.5mbgl).
- **S4:** Use of imported inert waste materials in re-profiling works.

Sources – Operational Phase

- **S1:** Storage of soils, with potential for waste materials;
- **S2:** Increased surface water run-off due to increased low permeability hardstanding area;
- **S3:** Surface water quality decline, potentially including conductivity and suspended solids;
- **S4:** Increased flows within surface water features, resulting in an increased volume of water entering Nelson Bog SSSI;
- **S5:** Use of imported inert waste materials in re-profiling works.

Pathways

- **P1:** Surface water runoff;
- **P2:** Short circuit migration pathways;
- **P3:** Leachate generation;
- **P4:** Limited vertical migration.

Receptor

- **R1:** Surface water features (Spring issues at surface, streams etc);
- **R2:** Shallow groundwater;
- **R3**: Nelson Bog SSSI (and associated ecology).

5.1 Mitigation and Monitoring Measures

The proposed mitigation and monitoring measures are covered in detail within Table 4-1 of this risk assessment report.

Mitigation and monitoring measures include, the implementation and updating of the Construction Environmental Management Plan for the construction phase works, the laboratory testing of soils prior to the importation to site to ensure the suitability for use, watching brief accompanied by logging and photographing of lagoon excavations by a suitably qualified environmental consultant and on-going monitoring of surface water features which eventually drain into the Nelson Bog SSSI.

The works will be progressed under a bespoke environmental permit, which will cover the waste recovery related works, including the importation, acceptance and placement of inert waste materials as part of the proposed development.

5.2 Conclusions

Following the implementation of the highlighted mitigation measures during both the enabling / construction phase, as well as across the operational lifespan of the proposed development, it is believed that the potential impacts on the identified sensitive receptors can be offset.

It is therefore considered that the potential risks should not preclude the proposed development as detailed and covered by the planning application 22/0567/FULL with CCBC.

The site has a number other operations and a live working Water Quality and Quantity Monitoring & Contingency Plan, with monthly visits to allow the collection of water samples for water quality testing and to record water level, and flow velocities where possible, at the monitoring points across the Site .

There are no compliance points set as part of this qualitative risk assessment. Instead, as part of the current Water Quality and Quantity Monitoring & Contingency Plan, up-gradient and down-gradient positions for both groundwater and surface water environments are monitored on a monthly basis. It is recommended that monitoring points are established at the bordering water courses as mapped in Figure 2-5 and Drawing 3, located to the east and west of the proposed development Site.

Other surface water features located to the east of the proposed development site (closer to the quarry) are currently monitored as part of the groundwater abstraction and discharge licenses.

Drawings

Drawing 1

Bedrock Geology with Proposed Development Plan

HYDROGEO

HYG734 - Bryn Quarry

DRAWING 1 Bedrock Geology and Proposed Development Plan

KEY

- HYG734 Site Boundary
- Ordnance Survey Watercourses

GBR BGS 1:50k Linear features

- Inferred Fault at surface
- Inferred Coal Seam Outcrop

GBR BGS 1:50k Bedrock

- Grovesend Formation - Mud- & Siltstone
- Grovesend Formation - Sandstone

Proposed Development Plan provided to Hydrogeo by the Client Team

0 25 50 75 100 m

N

Date	By	Paper	Scale	Rev
01 2024	SG	A3	1:2,750	1

Drawing 2

Conceptual Site Model

Key:

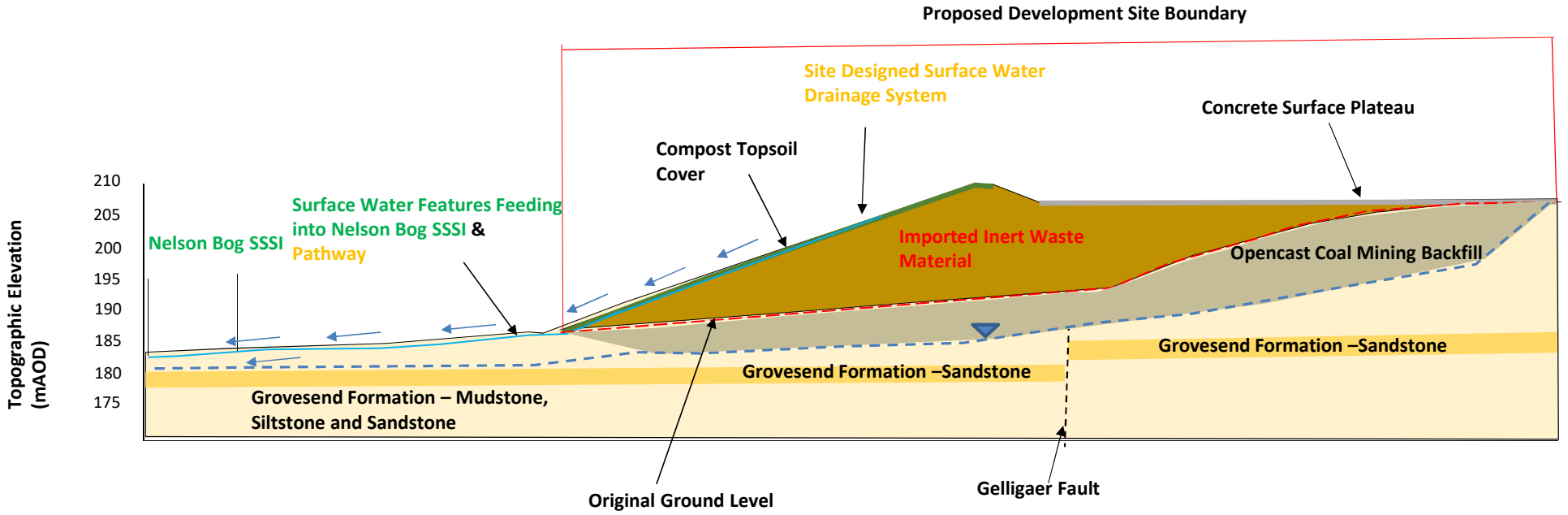
Source

Pathway

Receptor

Groundwater level has been assumed at the base of the opencast coal mining backfill material. Pathway & Receptor

Surface Water Flow



DRAWING 2 – Site Cross-Section Conceptual Model

NOTE: Figure adapted from Client Team Drawing BRL-MRFYD-2-23-015 Section.

Client: Bryn Recycling Ltd

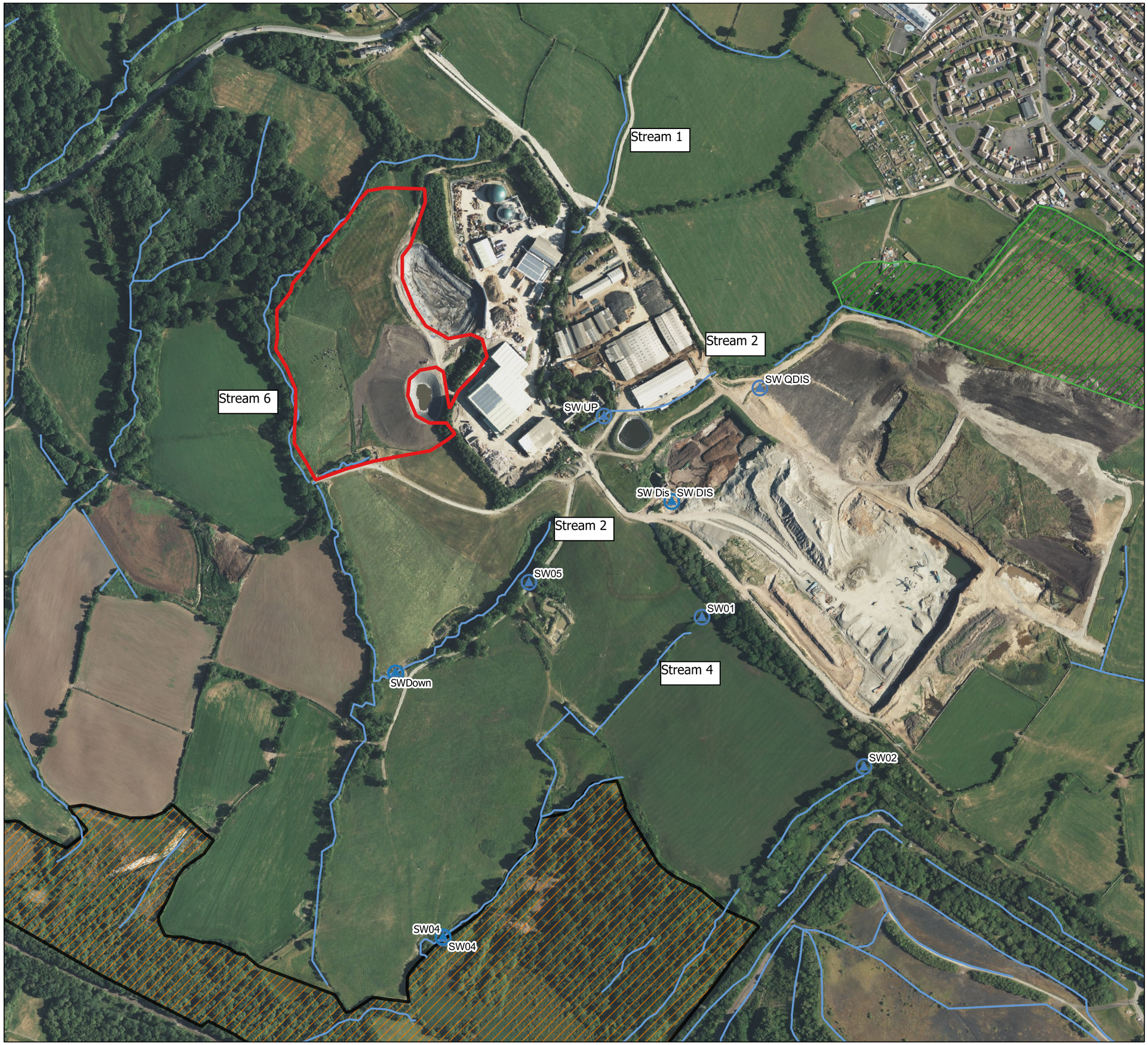
Project: Bryn Quarry – MRF Extension Ref:HYG734

Date: 10 2023 Drawn By: SG Checked: MW

HYDROGEO Telephone:01873 856813 Email:mike@hydrogeo.co.uk Web:www.hydrogeo.co.uk

Drawing 3

Proposed Development Location with Sensitive Sites and Surface Water Features



HYDROGEO

HYG734 - Bryn Quarry (MRF Risk Assessment)

DRAWING 3 MRF Watercourses

KEY

- Existing OS Watercourse
- MRF Site Boundary
- Current Surface Water Monitoring Locations
- Waun Rhydd SINC
- Nelson Bog SSSI

0 50 100 150 200 m

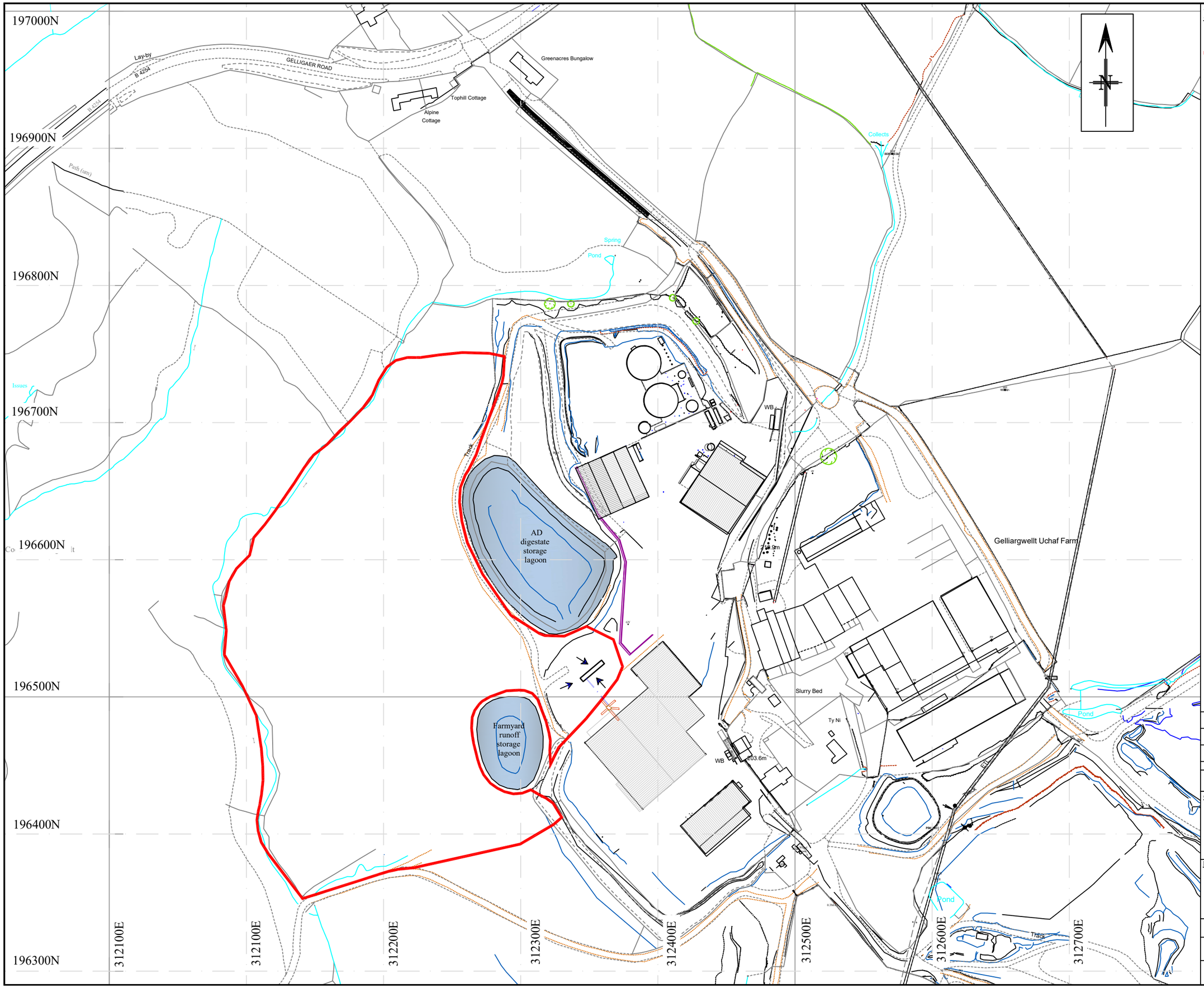
N

Date	By	Paper	Scale	Rev
11 2023	SG	A3	1:5,000	1

Appendices

Appendix A

Construction and Operational Drainage Management Drawings



KEY

Application boundary (approximate area 7.01ha)

REV'N	DATE	AMENDMENT

J P C E Limited

CLIENT
BRYN RECYCLING Ltd
GELLIARGWELLT FARM
GELLIGAER ROAD
GELLIGAER
CAERPHILLY
CF82 8PY

JOHN PERKINS
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DRAWING TITLE & SCHEME

PROPOSED ADDITIONAL RECYCLATE SEPARATION FACILITY & ASSOCIATED INFRASTRUCTURE AT GELLIARGWELLT FARM, NELSON

Location Plan

Drawing Number	Drawn By :
BRL-MRFYD-2023-009	J PERKINS
Date : APRIL 2023 / Scale 1:2500@A3	Checked :

196800N

196700N

196600N

196500N

196400N

196300N

312100E

312200E

312300E

312400E

312500E

312600E

312700E

AD Plant

WB

Storage areas

Track

AD Reception & drying areas

AD digestate storage lagoon

219.9m

Gelliargwellt Uchaf Farm

Farm Buildings

Both lagoons are fully HDPE lined with no discharge, all liquid is pumped out as required.

Existing Concrete process water holding tank

Mobile waste separation plant

Slurry Bed

Ty Ni

Farmyard runoff storage lagoon

WB

203.6m

MRF Buildings

Track

Pond

Track

DENSE VEG

DITCH CONTINUE ON SAFE TO ACCE

KEY

- Application boundary (approximate area 7.01ha)
- Existing lagoons used by other operations
- Indicative location of temporary surface water drainage
- Proposed surface water carrier drain at the toe of the slope
- Proposed sideslope surface water runoff attenuation lagoon
- Silt Fence to protect watercourse dying construction works

REV'N	DATE	AMENDMENT

J P C E Limited

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PROPOSED ADDITIONAL RECYCLATE SEPARATION FACILITY & ASSOCIATED INFRASTRUCTURE AT GELLIARGWELLT FARM, NELSON

Existing Situation

Drawing Number		Drawn By :
BRL-MRFYD-2023-010		J PERKINS
Date : APRIL 2023	Scale 1:1000@A3	Checked :

196800N

196700N

196600N

196500N

196400N

196300N

312100E

312200E

312300E

312400E

312500E

312600E

312700E

Concrete surfaced area with falls directed towards lagoon as shown.

Stone filled interconnecting ditches to "filter out" small plastic particles.

Final Lagoon

New Manhole chamber with Hydro-Brake Optimum flow control device to suit 0.5m head. (See Detail)

AD digestate storage lagoon

Farmyard runoff storage lagoon

Existing Concrete process water holding tank

Mobile waste separation plant

MRF Buildings

Storage areas

Power Station

AD Plant

Tanks

AD Reception & drying areas

Farm Buildings

Gelliargwellt Uchaf Farm

Slurry Bed

Ty Ni

Slurry Bed

Pond

Track

WB

219.9m

203.6m

A

A'

B

B'

209

209

208

KEY

- Application boundary (approximate area 6.45ha)
- 200 Contours (mAOD) - 5m intervals
- Top of new screening bund
- 209 Proposed screening bund elevation (mAOD)
- Surface water flow directions
- Access track
- Public Right of Way GELI/FP166/1
- Existing lagoons used by other operations
- Proposed extent of land raising
- Proposed woodland
- Indicative location of proposed sideslope surface water drainage
- Proposed surface water carrier drain at the toe of the slope
- Proposed MRF yard surface water storage lagoon
- Proposed sideslope surface water runoff attenuation lagoon
- Section locations
- Silt Fence to protect watercourse dying construction works

REV'N	DATE	AMENDMENT
I	28-11-2022	LAGOONS RE-SITED, REED BEDS REMOVED
H	22-11-2022	SOUTHERN LAGOONS ADDED

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PROPOSED ADDITIONAL RECYCLATE SEPARATION FACILITY & ASSOCIATED INFRASTRUCTURE AT GELLIARGWELLT FARM, NELSON

PROPOSED PLAN

Drawing Number	Drawn By :
BRL-MRFYD-2023-011	J PERKINS

Date :	Scale	Checked :
APRIL 2023	1:1000@A3	

TYPICAL SILT FENCE CONSTRUCTION

196800N

196700N

196600N

196400N

196300N

312000E

312100E

312200E

312300E

312400E

312500E

312600E

AD Plant

AD Reception & drying areas

AD Reception & drying areas

AD digestate storage lagoon

Farmyard runoff storage lagoon

MRF Buildings

Farm Buildings

Slurry Bed

Ty Ni

Gelliargwell

Pond

Spring

Pond

Track

WB

WB

219.9m

203.6m

Construction Sequence:-

1. Silt Fencing established.
2. Lagoons excavated from lowest point.
3. Interconnecting ditches dug.
4. Temporary drainage ditches excavated as and where required.
5. Ditches to be backfilled/re-located as construction works proceeds.
6. Slope filled from base towards the top with compaction every 0.5m vertically.

KEY

- Application boundary (approximate area 7.01ha)
- 200 — Existing lagoons used by other operations
- Indicative location of temporary surface water drainage
- Proposed surface water carrier drain at the toe of the slope
- Proposed sideslope surface water runoff attenuation lagoons
- Silt Fence to protect watercourse during construction works

REV'N	DATE	AMENDMENT

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DRAWING TITLE & SCHEME

PROPOSED ADDITIONAL RECYCLATE SEPARATION FACILITY & ASSOCIATED INFRASTRUCTURE AT GELLIARGWELLT FARM, NELSON

1st Stage Construction- Establishment of SSSI Protection Measures

Drawing Number		Drawn By :
BRL-MRFYD-2023-012		J PERKINS
Date : APRIL 2023	Scale 1:1000@A3	Checked :