Technical Appendix 8.6 Borrow Pit Appraisal

Hagshaw Energy Cluster – Western Expansion

Spirebush Ltd and 3R Energy Solutions Ltd

Prepared by:

SLR Consulting Limited

SLR Project No.: 405.065521.00001

13 March 2025

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0	13 March 2025	R. Watson	A. Huntridge	JH

Basis of Report

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1.0 Introduction

SLR Consulting Ltd (SLR) was commissioned by 3R Energy Solutions Ltd on behalf of Spirebush Ltd (the 'Applicant'), to undertake a Borrow Pit Appraisal (BPA) for the proposed Hagshaw Energy Cluster – Western Expansion | Phase 1 (the 'Proposed Development').

The Applicant is proposing to submit a Section 36 application to construct a mixed renewable energy development comprising of up to 18 wind turbines, solar farm and an on-site Battery Energy Storage System (BESS). The Proposed Development is detailed in **Environmental Impact Assessment (EIA) Report Chapter 3 Project Description** and in **EIA Report Figures 3.1** and **3.2.**

There has been substantial work undertaken to date at the Proposed Development to inform the proposed borrow pits, including site reconnaissance visits and several phases of peat probing which are detailed within **Technical Appendix TA 8.4: Peat Management Plan (PMP)** and **TA 8.5: Peat Landslide and Hazard Risk Assessment (PLHRA).**

The principal objective of this report is to provide an initial assessment of the aggregate requirements for the Proposed Development and identify potential borrow pits suitable for providing this aggregate.

There are four potential search areas for borrow pits that have been identified. SLR visited the borrow pit search areas when undertaking the phase II peat depth survey. Three borrow pit search areas have been identified within the 'northern development area' (where the proposed wind turbines and alternative BESS and substation are located) and one within the 'southern development area' (where the proposed solar arrays, BESS and substation are located). The proposed borrow pit search areas have been predominantly selected due to their location, where mapping indicates bedrock is likely to occur close to surface. Other factors included environmental impacts such as sensitive habitats and peat depth, morphology, and orientation. Limited superficial soils are expected at these locations. The borrow pit locations are located a minimum of 50 m from watercourses.

The work has been undertaken by a team of Geotechnical Engineers and Geologists, with over 17 years' consultancy experience specialising in the assessment of soils, geology and water for renewable power projects in Scotland.

2.0 Desk Based Review

This assessment has been completed through a largely desk-based review of soil and geological maps and OS contour data with site reconnaissance undertaken by a geologist and geotechnical engineer, to cross-check the geological desk-based review.

2.1 Land Use and Topography

The Proposed Development site comprises a total area of c.965 hectares (ha), split into two main development areas as described in Section 1.0. The northern development area is located within the west of Dungavel Forest, within South Lanarkshire. The southern development area is located approximately 1.4 km north of Muirkirk in East Ayrshire.

The northern development area primarily comprises commercial forestry with a series of summits which include Dungavel Hill (458 m, Above Ordnance Datum (AOD)), Auchengilloch (462 m AOD), Brown Hill (313 m AOD) and Regal Hill (428 m AOD). The southern development area is located on the south facing lower slopes of Middlefield Law (466 m AOD), comprising primarily agricultural fields.

2.2 Superficial Geology

BGS Onshore GeoIndex[1] Mapping indicates that the majority of the northern development area is underlain by peat. Devensian till deposits are mapped in the west of the northern development area and along the Powbrone Burn and its tributaries. Alluvium and glaciofluvial deposits are also associated with Powbrone burn and its tributaries.

The southern development area is primarily underlain by Devensian till deposits with alluvium and glaciofluvial deposits associated with on-site watercourses.

EIA Report Figure 8.3 shows the superficial geology mapping and the Proposed Development.

2.3 Bedrock Geology

BGS Onshore GeoIndex Mapping indicates that the northern development area is predominantly underlain by Silurian Plewland Sandstone Formation and Middlefield Conglomerate Formation of the Dungavel Group, with a small, isolated, South of Scotland Granitic Suite intrusion of the Caledonian Supersuite, as shown in **EIA Report Figure 8.6**. The Logan Formation, consisting of sandstone, siltstone and mudstone, of the Waterhead Group underlies the north-east and Swanshaw Sandstone Formation of the Lanark Group underlies the north-west of the northern development area. The northern development area is heavily faulted with 11 inferred faults mapped.

The west of the southern development area is underlain by Devonian Kinnesswood Formation, consisting of sandstone, and Carboniferous Ballagan Formation, consisting of argillaceous rock, dolostone and sandstone, within the Inverclyde group. The east of the site is predominantly underlain by Silurian Ponesk Burn Formation, with Patrick Burn Formation, Castle Formation, Blaeberry Formation and Dunside Formation in the north, all of the Hagshaw Group, consisting of greywackes, sandstones, siltstones and mudstones. The southern development area is also heavily faulted with eight inferred faults mapped.

EIA Report Figure 8.6 shows the bedrock geology mapping and the Proposed Development.

1 BGS Online Viewer, available at: https://mapapps2.bgs.ac.uk/geoindex/home.html?

2.4 Mining

A review of the Mining Remediation Authority (formerly Coal Authority) [2] map shows that the southern development area is located within a coal mining reporting area, however there are no historic coal mining features within the site boundary. In their scoping response the Mining Remediation Authority (formerly Coal Authority) indicated that "*records do not indicate the presence of any coal mining features at surface or shallow depth in the area identified above by the updated red line boundary*."

2.5 Hydrogeology

Silurian Rocks (Undifferentiated) bedrock aquifer underlies the majority of the site, with the Inverclyde Group bedrock aquifer underlying the west of the southern development area, as shown in **EIA Report Figure 8.7**. The Scottish Environment Web Map defines the Silurian Rocks (Undifferentiated) bedrock aquifer as a low productivity Class 2C aquifers. The Inverclyde Group bedrock aquifer is classified as a moderately productive, Class 2B aquifer. Groundwater flow within both aquifers is defined as 'virtually all flow occurs through fractures and discontinuities'.

In accordance with BGS and SEPA Open Report (OR/15/028), the Silurian- Ordovician bedrock underlying the majority of the site forms low productivity aquifers with groundwater flow largely through fractures. Flow paths typically follow surface water catchments with flow path lengths between 0.1 km to 1 km. The Inverclyde Group is described within the Carboniferous bedrock by BGS and SEPA, which is noted to be extensively mined. The Carboniferous bedrock is noted to form moderately productive aquifers, with groundwater flow largely in fractures, or through intergranular space and mineral voids. Flow paths are dominated by historical mining with flow path lengths between 1 km to 10 km.

The SEPA Water Classification Hub shows the bedrock aquifers underlying the site to be within the North Glengavel (ID: 150575) groundwater body in the northern development area, and South Glengavel (ID: 150514) and Ayr (ID: 150669) groundwater bodies in the southern development area. North Glengavel and South Glengavel are noted to have an overall status and water quality of 'Good', while Ayr is classified as 'Poor' in 2023.

2 The Coal Authority, The Coal Authority Map Viewer, available online at: https://datamine-cauk.hub.arcgis.com/

3.0 Borrow Pit Assessment

This section of the report provides an assessment of the four potential borrow pit search area locations with an evaluation of their potential to meet the Proposed Development's aggregate requirements.

The assessment has been completed through a desk-based review of geological maps and memoirs and is supported by several site visits from SLR geologists and a geotechnical engineer. Potential borrow pit locations were inspected visually with a view to assess ground conditions and help determine the borrow pit's suitability for use during construction of the Proposed Development.

In exploring the four potential borrow pit search area locations, consideration has been given to the practical aspects of each borrow pit. The main aspects to consider are as follows:

- ease of access;
- rock type;
- overburden thickness;
- topography;
- current and historical uses;
- proximity to construction activities;
- visual impact; and
- impact on environmentally sensitive areas.

Steeper topography is preferable for quarrying, where peat and soils coverage will be limited. Careful consideration was given to landscape and visual impacts, and other considerations included proximity to watercourses and places interest. The proposed borrow pits are in areas where the peat cover is typically thinner or vacant and aggregate reserves are expected to occur near the surface.

3.1 Aggregate Requirements

The proposed turbine locations and solar farm cells and their subsequent maintenance would require the construction of a purpose-built network of access tracks. These tracks would be single track with occasional passing places, un-metalled and would be constructed to the turbine suppliers' specifications conforming to the Specification for Highway Works (SHW)[3].

The indicative volumes of aggregate required for site infrastructure are summarised in Table A and Table B based on the materials calculator provided in **Annex A**.

The aggregate requirements below have been calculated based on estimate of aggregate volumes required.

Table A: Aggregate Requirement Summary (Northern Development Area)

Infrastructure Element	Volume of Aggregate Required (m^3)
Excavated Track	24,986
Upgraded Track	1,120
Turning Heads	979

3 Highways Agency, Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works, Series 600 Earthworks, Published February 2017.

Infrastructure Element	Volume of Aggregate Required (m^3)
Turbine Bases - formation only	6,359
Fill above Turbine Bases	16,434
Permanent Hardstandings	52,704
Blade Laydown	27,000
Substation (Inc Temp, Perm, SPEN and BESS)	14,560
Main Construction Compound	3,840
Total	**147,981**

Table B: Aggregate Requirement Summary (Southern Development Area)

Infrastructure Element	Volume of Aggregate Required (m^3)
Excavated Track	15,706
Construction Compound	2,000
BESS and Substation	17,860
SPEN Temporary Compound	6,000
Total	**41,566**

It has been estimated that approximately 147,981 m^3 (northern development area) and 41,566 m^3 (southern development area) of suitable quality rock would be required to construct the Proposed Development. This includes SHW[3] classes 6F2, 6N/6P and concrete aggregate. If rock quality is not suitable for each of these engineered materials, then there may be a requirement for imported materials.

No account has been taken in the calculations for the fortuitous 'winning' of rock during the construction phase for example during infrastructure excavations. If such rock was available, the amount extracted from the borrow pits could be reduced.

3.2 Borrow Pit Assessment

This section of the report provides an assessment of the four borrow pit search areas together with an evaluation of their potential to meet the Proposed Development's aggregate requirements. The Borrow pit design within each search area is detailed within **TA 8.6 Figures 1** and **2**.

All borrow pits could be extended or reduced in size depending on review of aggregate requirements and/or ground investigation data.

The geology encountered within the Proposed Development is supported by BGS geological maps for the Proposed Development. Dimensions of the borrow pits, volume of superficial material to be removed and volumes of site won rock for each borrow pit have been estimated based on cross-sections developed through a digital terrain model. These are required to be confirmed by future intrusive ground investigation works.

The calculations provided in this report assume a worst-case scenario and where no other rock or materials would be found on site during construction. In the event that such rock was available the amount extracted from the borrow pits could be reduced.

3.2.1 Borrow Pit 01

Borrow Pit 01 is located in the western area of the Proposed Development (northern development area) close to (turbine) T4 at the approximate National Grid Reference (NGR) NS 67231 34705.

Photo 1: BP01 facing north-west (19/11/2024)

Table C: Borrow Pit 01

Borrow Pit 01	
Superficial Geology	No superficial deposits mapped in south Peat mapped at northern extent
Bedrock Geology	Plewland sandstone formation – formed of sandstone and minor siltstone
Inferred Design Parameters	Overall slope angle 70° Maximum face height 15m
Gradient	Slope increasing steeply towards the north-east
Details of Extraction	Combination of drilling and blasting
Estimated Excavation Area	7,870 m^2
Estimated Excavation Volume	52,000 m^3

3.2.2 Borrow Pit 02

Borrow Pit 02 is located in the centre of the Proposed Development (northern development area) adjacent to T10 at the approximate National Grid Reference (NGR) NS 68143 34125.

Photo 2: BP02 facing west (19/11/2024)

Table D: Borrow Pit 02

Borrow Pit 02	
Superficial Geology	Glacial Till – Diamicton, Sand and Gravel
Bedrock Geology	Middlefield Conglomerate Formation – Boulder conglomerate formed of quartzite, jasper, igneous rock and sandstone
Inferred Design Parameters	Overall slope angle 70° Maximum face height 15m
Gradient	Slope increasing steeply towards the north
Details of Extraction	Combination of drilling and blasting
Estimated Excavation Area	7,680 m^2
Estimated Excavation Volume	55,700 m^3

3.2.3 Borrow Pit 03

Borrow Pit 03 is located in the east of the Proposed Development (northern development area) to the south of T11 at the approximate National Grid Reference (NGR) NS 68906 33765.

Photo 3: BP03 facing south-east (19/11/2024)

Table E: Borrow Pit 03

Borrow Pit 03	
Superficial Geology	Peat deposits
Bedrock Geology	Middlefield Conglomerate Formation – Boulder conglomerate formed of quartzite, jasper, igneous rock and sandstone
Inferred Design Parameters	Overall slope angle 70° Maximum face height 15m
Gradient	Slope increasing steeply towards the south-east
Details of Extraction	Combination of drilling and blasting
Estimated Excavation Area	7,415 m^2
Estimated Excavation Volume	58,100 m^3

3.2.4 Borrow Pit 04

Borrow Pit 04 is located in the north of the southern development area of the Proposed Development along the main access track at the approximate National Grid Reference (NGR) NS 69683 30112.

Photo 4: BP04 facing west (19/11/2024)

Table F: Borrow Pit 04

Borrow Pit 04	
Superficial Geology	Glacial Till – Diamicton, Sand and Gravel
Bedrock Geology	Patrick Burn Formation – Sandstones, siltstone and mudstone Kip Burn Formation – Mudstone
Inferred Design Parameters	Overall slope angle 70° Maximum face height 15m
Gradient	Slope increasing steeply towards the north-west
Details of Extraction	Combination of drilling and blasting
Estimated Excavation Area	6,000 m^2
Estimated Excavation Volume	53,700 m^3

4.0 Indicative Borrow Pit Design

The indicative borrow pit volumes are presented in Table C to Table F. The design of the borrow pits anticipates extracting a net stone volume suitable for the requirements of the Proposed Development, excluding imported top surface dressing which would require importing. This target capacity has been determined based on the estimated requirements for construction materials together with additional allowances for overburden material. It is envisaged that overburden/soils together with processed materials would be carefully stored adjacent to the excavation void for eventual use in the restoration process.

4.1 Marking Out and Overburden Stripping

The permitted extents of the borrow pit would be marked out with pegs, and overburden, including topsoil, subsoil and weathered rock horizons, would be stripped from within this delineated area.

The overburden and weathered rock horizons would be stripped using a combination of crawler tractor dozers and backtrackers with the material loaded by loading shovels. The overburden (including surface vegetation turves) would be carefully stripped and stored as a series of separate turves, topsoil, subsoil and weathered rock storage mounds to be used for reinstatement purposes.

4.2 Excavations within Rock

Once overburden and weathered rock horizons have been stripped, and stored, a suitably qualified geotechnical engineer/blasting engineer would assess the nature of the underlying solid rock strata. The engineer would provide advice on suitable extraction techniques including; extraction method, bench and cut face design parameters, and blasting design (if required).

If blasting is required, blasting would be undertaken in accordance with the Quarries Regulations 1999[4] and Annex D PAN 50[5].

A combination of digging, ripping and blasting would be utilised to excavate rock (subject to the nature of the material encountered, depth of weathering and level of fracturing) which would be processed using a mobile crushing and screening plant, which would be sited within the base of the working borrow pit.

4.3 Stockpiling of Materials

The initial overburden strip would be stored within temporary screening mounds around the perimeter of the borrow pit. The screening mounds would be at least 1.5m in height.

The remaining unsuitable materials (weathered/unsuitable rock horizons) would be stockpiled within the base of the working borrow pit. The stockpiles would have a maximum height of 5m, with maximum side-slope gradients of 1(Vertical (V)) in 2.5(Horizontal (H)) and be in full compliance with the Quarries Regulations 1999[4] and Quarries National Joint Advisory Committee (QNJAC) Guidelines[6]. This material would be used as part of the restoration profiling on the cut faces.

4 Health and Safety Executive (2014), Health and Safety at Quarries, Quarries Regulations 1999, Approved Code of Practice and Guidance (Second Edition).

5 Scottish Government (2000), PAN 50 Annex D: Controlling the Environmental Effects of Surface Mineral Works.

6 Quarries National Joint Advisory Committee (2020), Available at: http://qnjac.co.uk/what-is-qnjac/. Last accessed April 2020.

4.4 Access Tracks/Haulage Routes

The proposed access tracks to the borrow pit(s) would include suitable roadside drainage ditches, with soakaways located, where appropriate.

The tracks (haulage routes) within the borrow pit(s) would have a gradient of no steeper than 1(V) in 10(H).

4.5 Water Management/Drainage

The borrow pit(s) would feature a perimeter surface drain, which would aim to prevent water in-flow into the borrow pit. The water collected within the surface drains would be discharged either into the surrounding vegetation, or into suitably located settlement lagoons.

Where necessary, surface settlement lagoons would be constructed within the borrow pit. These would be constructed with the aim of containing any surface water collection within the excavation voids, and from collection of water from the perimeter surface drains. The lagoons would be contained within a bunded area at the base of the borrow pit, with suitable pumping systems installed allowing water to be pumped to soakaways as required.

4.6 Restoration

When considering the borrow pit excavations the principles of the relevant guidance[7,8] of the re-use of excavated peat and the minimisation of waste have been consulted. This guidance stats that across the borrow pit areas, peaty soils may be used at depths of up to 0.5 m as part of the borrow pits' reinstatement works. The final configuration of the borrow pits shall allow retention of rainfall and promote the infiltration of this to the peat and peaty soils used to restore the borrow pits which will prevent peat drying out. Surface vegetation and acrotelmic peat layers, safeguarded from parts of the site where peaty soils and peat are excavated will be used to restore surface of the borrow pits and prevent erosion.

The formulation of a detailed construction method statement undertaken pre-construction shall incorporate construction design and sequencing for the proposed restoration of borrow pit areas. These plans shall draw on detailed site investigation information gathered as part of the preconstruction phase of works. The final design of borrow pit floor levels and restoration profiles shall depend on the depth of superficial deposits and the quality of rock recorded across the proposed borrow pit locations.

The aim of the restoration of borrow pits is to achieve a self-sustaining hydrological system that retains the carbon stored within the peat deposits. The geometry of the borrow pit shall be such that retention of shallow groundwater once restored will prevent the peat drying out. This could be achieved by the excavation and/or formation of impervious bunds or by combining the two approaches. Bunds should be constructed with stone as peat cannot stick to mineral to retain basal peat. Bunds should be approximately 30 m cells or smaller to increase residence times of water within the borrow pit. A further key requirement will be to maintain a source of water to the restoration area to allow for suitable hydrological conditions to develop. The existing peatland within the area is largely fed by ombrotrophic (rain-fed) from rainfall rather than ground-water sources and this should be sufficient to keep the reinstated peat wet.

An assessment of the water level/depth to saturated peat in the borrow pit will be recorded quarterly and reported annually for a period of five years, following placement of peat. This

7 NatureScot (July 2024), Good Practice During Wind Farm Construction. https://www.nature.scot/doc/good-practice-during-wind-farm-construction

8 Scottish Renewables, Scottish Environment Protection Agency. 2012. Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste

could be recorded by inserting a peat probe at a number of locations across the restoration surface or by establishing a small network of hand driven dip wells where it is safe to do so. In addition, annually for a period of five years, following placement of peat:

- the edge of the peat would be inspected to assess for potential loss of water; and
- evidence of drying (e.g. surface cracking and /or erosion) would be assessed and reported.

Should the monitoring data suggest the peat is drying, mitigation measures would be agreed with SEPA and NatureScot.

Full details of restoration would be determined following pre-construction ground investigation work and detailed borrow pit design.

5.0 Conclusion

In summary, four borrow pit search areas have been assessed as being capable of supplying all the aggregate required for the Proposed Development. The locations and methods of working would be managed to cause minimal impact to the ground conditions and water environment. The borrow pit design and recommended methods of operation are in line with the Quarries Regulations, Approved Code of Practice, 1999 (as amended)[9] to provide a safe working environment and minimise risk of instability.

An approximate volume of excavated materials has been calculated for each of the proposed borrow pit locations within the borrow pit search areas, these volumes are based on initial calculations based on assumptions for the Proposed Development. These calculations would be verified by detailed intrusive investigation at the proposed locations, post-consent. Calculations do not take into consideration the 'winning' of materials along the route. Each of the proposed borrow pits selected could be increased or decreased in size, depending on the aggregate requirements or following an assessment of the suitability of aggregate materials following detailed ground investigation.

The quality of rock anticipated on-site is inferred from a visual assessment of rock outcrops and published information. An intrusive ground investigation, sampling and material laboratory testing will be required to confirm ground condition and suitability.

Prior to the construction of the Proposed Development, design and best practices, and any required mitigation measures, will be set out in full within a Construction Environmental Management Plan (CEMP) and can be secured by an appropriately worded pre-development planning condition.

9 Health and Safety Executive (2014), Health and Safety at Quarries, Quarries Regulations 1999, Approved Code of Practice and Guidance (Second Edition).

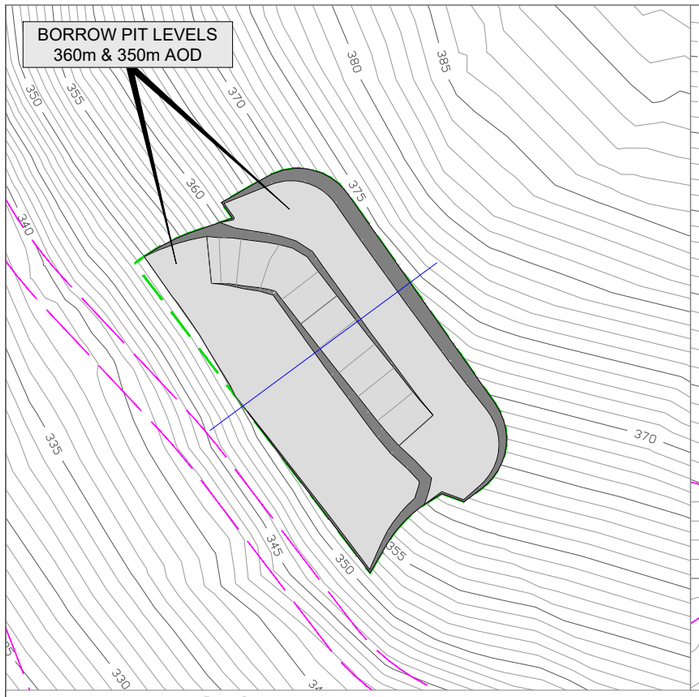
Figures

Technical Appendix 8.6 Borrow Pit Appraisal

Hagshaw Energy Cluster – Western Expansion

Spirebush Ltd and 3R Energy Solutions Ltd

SLR Project No.: 405.065521.00001



01 Plan of Borrow Pit Excavation
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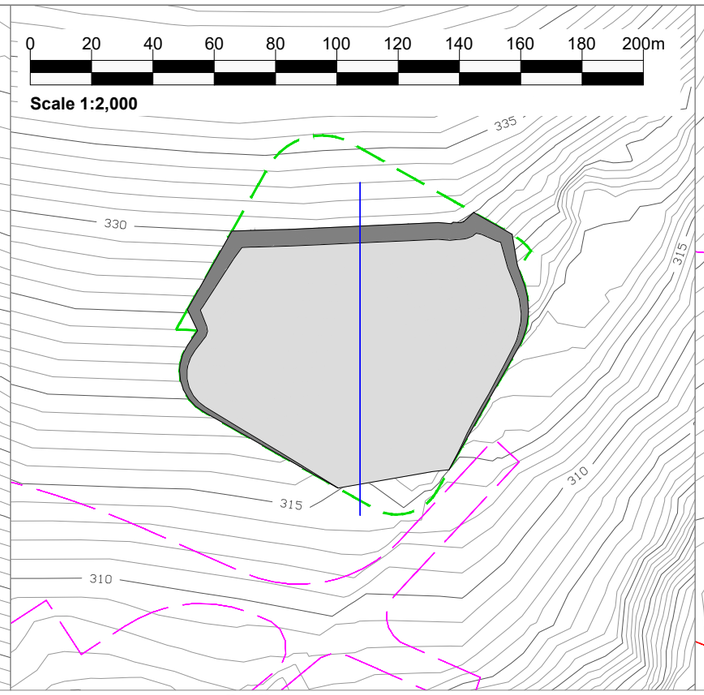
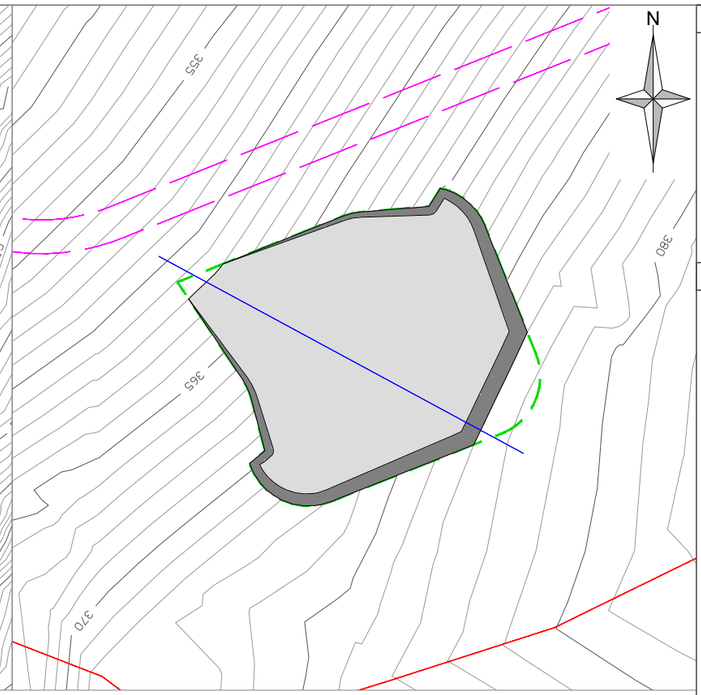


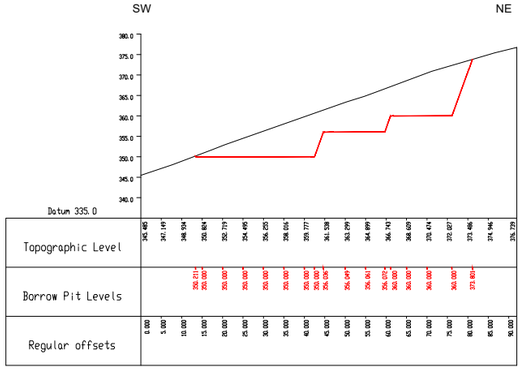
02 Plan of Borrow Pit Excavation
scale: 1:2,000



03 Plan of Borrow Pit Excavation
scale: 1:2,000

Borrow Pit Number	01	02	03
Total Excavation Area	7,870 m²	7,680 m²	7,415 m²
Total Excavation Volume	52,000 m³	55,700 m³	58,100 m³
Inferred Design Parameters	Slope angle 70°. Maximum face height of 15m. Ramp angle 1v:10h		
Excavation Required	Digging, Drilling and Blasting		
Rock Type	Sandstone	Conglomerate	Conglomerate
Coordinates for Centre of Borrow Pit	NS67231 34705	NS68143 34125	NS68906 33765

01 Cross Section of Borrow Pit Excavation
scale: 1:1,500



02 Cross Section of Borrow Pit Excavation
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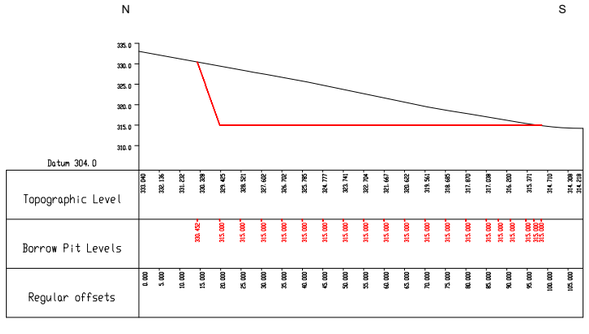
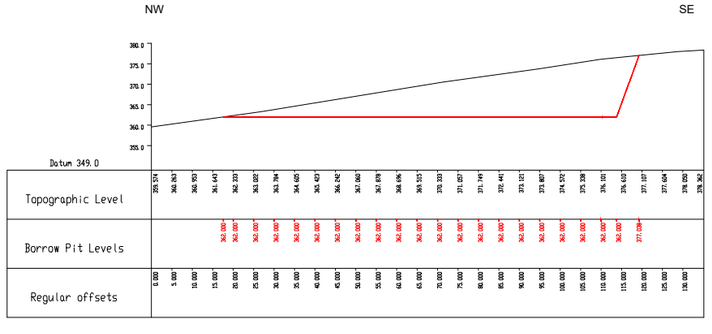


03 Cross Section of Borrow Pit Excavation
scale: 1:1,500



Notes:

Design parameters are indicative and should be refined based upon findings of ground investigations and or initial excavations, taking into account ground conditions and hydrological issues.

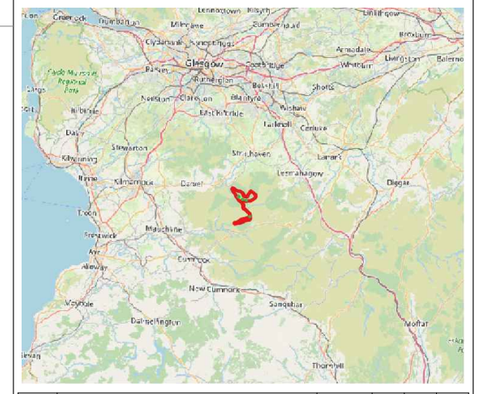
Legend:

Plans

- Base of Excavation
- Excavation Batter
- Borrow Pit Search Area
- Solar Access Tracks
- Site Boundary

Sections

- Section Line
- Excavation Profile
- Existing Topography



Rev	Amendments	Date	By	Chk	Auth

SLR

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Drawing Status & Suitability Code

Client
Spirebush Ltd and 3R Energy Solutions Ltd

Project
Hagshaw Energy Cluster Western Expansion Phase 1

Drawing Title
Borrow Pit Design - Northern Development Area

Scale	SLR Project No.
1:2,000 / 1:1,500 @ A3	405.065521.00001

Designed	Drawn	Checked	Authorised
SS	SS	RW	AH

Date	Date	Date	Date
DEC 2024	DEC 2024	DEC 2024	DEC 2024

Drawing Number
TA8.6 Figure 1

Rev.

18/12/2024

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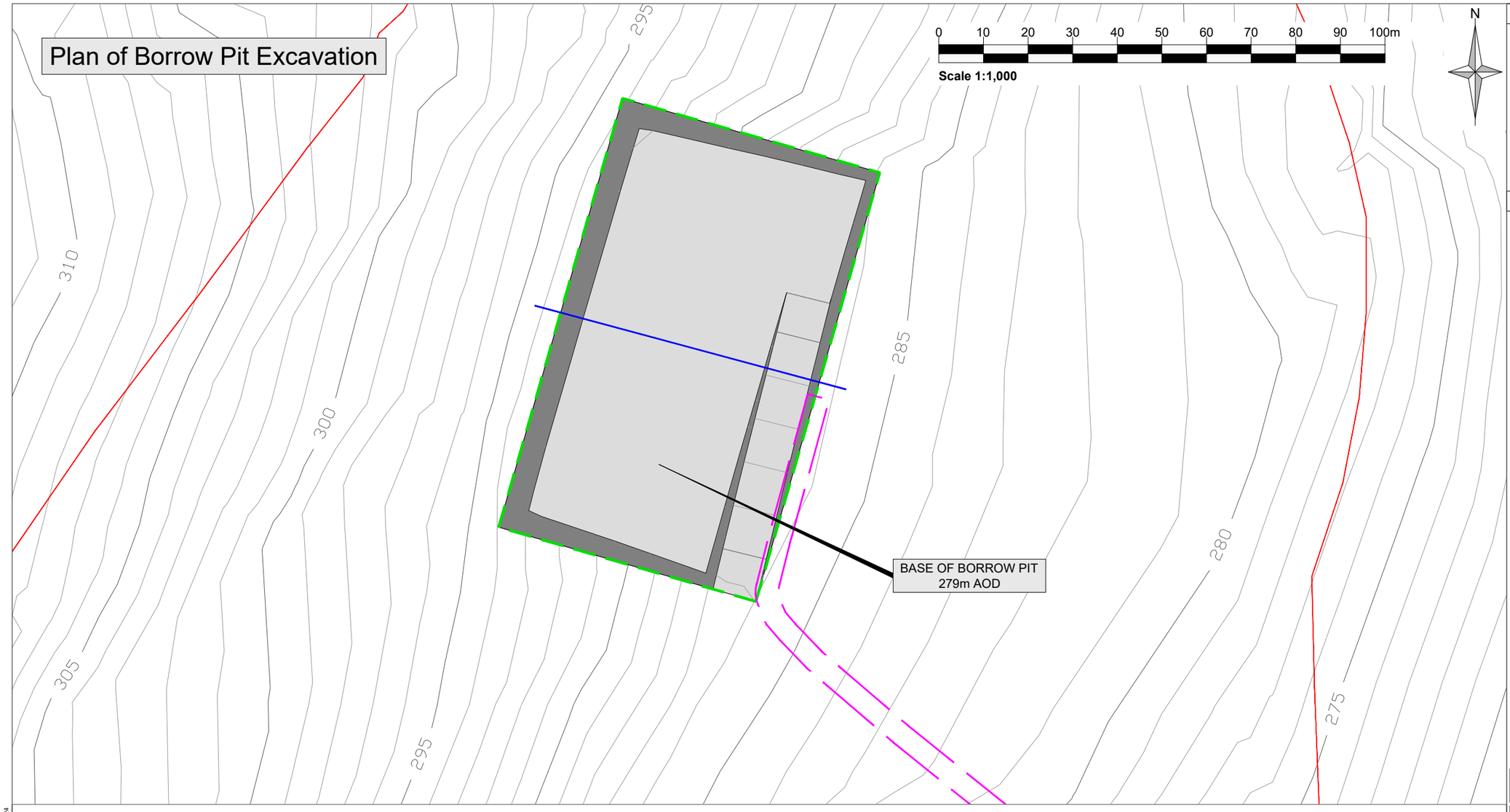
Plan of Borrow Pit Excavation



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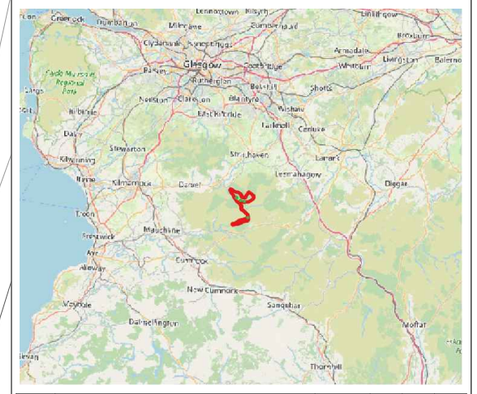

Rev	Amendments	Date	By	Chk	Auth

Cross Section of Borrow Pit Excavation

Scale 1:750

Borrow Pit	04
Total Excavation Area	6,000 m²
Total Excavation Volume	53,700 m³
Inferred Design Parameters	Slope angle 70°. Maximum face height of 15m. Ramp angle 1v:10h
Excavation Required	Digging, Drilling and Blasting
Rock Type	Sandstone, Siltstone & Mudstone
Coordinates for Centre of Borrow Pit	NS69683 630111

SLR

www.slrconsulting.com

Drawing Status & Suitability Code

Client
Spirebush Ltd and 3R Energy Solutions Ltd

Project
Hagshaw Energy Cluster Western Expansion Phase 1

Drawing Title
Borrow Pit Design - Southern Development Area

Scale	SLR Project No.
1:1,000 / 1:750 @ A3	405.065521.00001

Designed	Drawn	Checked	Authorised
SS	SS	RW	AH
Date	Date	Date	Date
DEC 2024	DEC 2024	DEC 2024	DEC 2024

Drawing Number
TA8.6 Figure 2

Rev.

18/12/2024

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Annex A Aggregate Assessment

Technical Appendix 8.6 Borrow Pit Appraisal

Hagshaw Energy Cluster – Western Expansion

Spirebush Ltd and 3R Energy Solutions Ltd

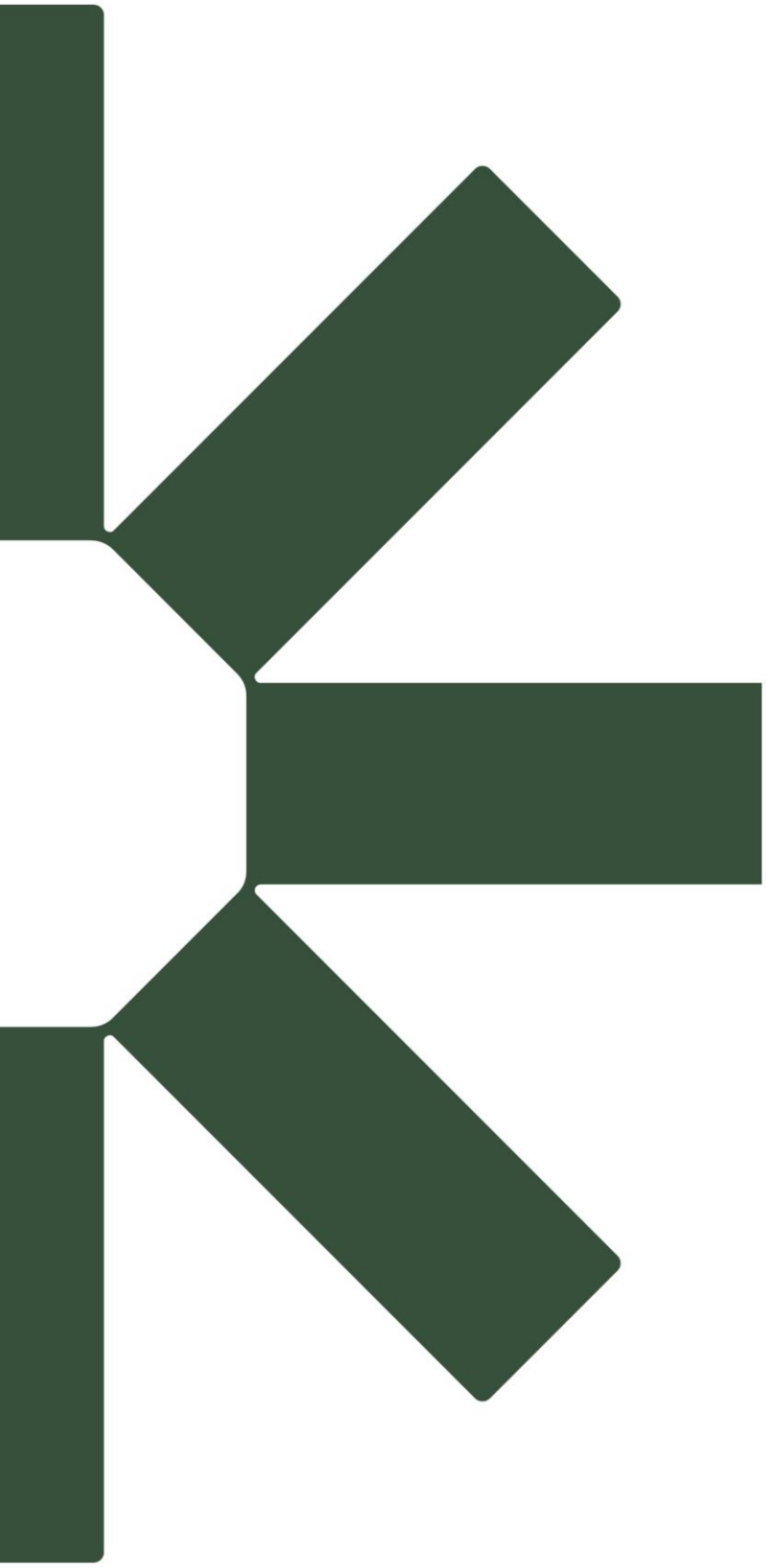
SLR Project No.: 405.065521.00001

Infrastructure	Length (m)	Width (m)	Area (m2)	Aggregate Thickness (m)	Number	Aggregate Volume (m3)	Notes:
Excavated Track	12493	5	62465	0.4	1	24986	
Upgraded Track	1120	2.5	2800	0.4	1	1120	
Turning Heads			1957	0.5	1	979	5 No. turning heads
Turbine Bases - formation only			707	0.5	18	6359	Assumes 30m diameter
Fill above Turbine Bases			707	2	18	16434	Less volume of concrete bases 10*900m^3 = 9,000m^3
Crane Hardstand			3428	1	18	52704	
Blade laydown			1875	0.8	18	27000	
Main Construction Compound			4800	0.8	1	3840	
Substation			7000	1	1	7000	
SPEN Substation			3560	1	1	3560	
SPEN Temporary Compound & BESS			5000	0.8	1	4000	
Total Requirement						**147981**	All volumes measurements in m^3, based on turbine requirements and information provided by Client

Potential Volume of Rock to be sourced on site	
BP1	52000
BP2	55700
BP3	58100
Total Volume from Site	165800
Import requirements (shortfall)	-17819
plus 10% contingency	-19601

Infrastructure	Length (m)	Width (m)	Area (m2)	Aggregate Thickness (m)	Number	Aggregate Volume (m3)	Notes:
Excavated Track	7906	5	39264	0.4	1	15706	
Construction Compound			2500	0.8	1	2000	
BESS & Substation			17860	1	1	17860	
SPEN Temporary Compound			7500	0.8	1	6000	
Total Requirement						**41566**	All volumes measurements in m^3, based on turbine requirements and information provided by Client

Potential Volume of Rock to be sourced on site	
BP1	
Total Volume from Site	53700
Import requirements (shortfall)	-12134
plus 10% contingency	-13348



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