ENERGY AND CLIMATE CHANGE ENVIRONMENT AND SUSTAINABILITY INFRASTRUCTURE AND UTILITIES LAND AND PROPERTY MINING AND MINERAL PROCESSING MINERAL ESTATES WASTE RESOURCE MANAGEMENT

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TNEI

**BESS DEVELOPMENT, BEAULY** 

LAND CAPABILITY FOR AGRICULTURE REPORT

**AUGUST 2024** 





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#### LAND CAPABILITY FOR AGRICULTURE REPORT

**AUGUST 2024** 

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## 1 INTRODUCTION

#### 1.1 Background

- 1.1.1 Wardell Armstrong LLP (WA) has been commissioned by TNEI on behalf of Field Beauly Ltd. (the Applicant) to undertake a Land Capability for Agricultural (LCA) survey on 14.6 hectares (ha) of agricultural land off the A862, near Beauly Scotland (Dunballoch Farm, Beauly, Inverness, IV4 7AY), hereafter referred to as 'the Site', to support the planning application for a Battery Energy Storage System (BESS) development with associated infrastructure, access and ancillary works (including landscaping and biodiversity enhancement).
- 1.1.1 An informed assessment in line with the *Land Capability Classification for Agriculture*<sup>1</sup> guidelines has been undertaken using a combination of professional judgement, guidance, legislation, and statutory policy.

#### 1.2 Site description

- 1.2.1 The site comprises a single agricultural field covering an approximate area of 14.6 ha currently under use for sheep grazing (see drawing GL10503/002).
- 1.2.2 To the east the site borders a forested area and to the north and west it shares a border with other agricultural fields. The river Beauly runs along its southwestern boundary. At the time of the survey, the current land use on the Site is improved grassland, with grazing sheep. The river bank is stabilised by a forested buffer area. No erosion features were observed at the time of the survey.

#### 1.3 Elevation

1.3.1 The Site's elevation ranges between 7 m AOD (metres above ordnance datum) close to the River Beauly and raises to 17 m AOD in the northeast.

#### Definitions

1.3.2 Land Capability for Agriculture was developed by the Macaulay Land Use Research Institute (1991, now James Hutton Institute). The classification comprises three main categories: the class, the division, and the unit. Land suited to arable uses (ploughing or tillage and growing a range of crops) is included in Classes 1 – 4, while land not suited to arable use is in Classes 5 – 7. Classes 3 – 6 are sub divided into divisions

<sup>&</sup>lt;sup>1</sup> Macaulay Land Use Research Institute (now James Hutton) Land Capability Classification for Agriculture (1991 – ISBN 0 7084 0508 8)



based on the type of restrictions present. LCA is assigned by investigating the physical soil properties and interrelated factors such as topography and climate; as well as assessing how they limit the land's suitability for agricultural use. Capability units specify the type of main limitation. The unit is designated using letters added after the Class and Division, e.g. 3.1w. The five principal kinds of limitations recognised are:

- Climatic limitations symbol c
- Gradient limitations symbol g
- Soil limitations symbol s
- Wetness limitations symbol w
- Erosion limitations symbol e
- 1.3.3 The limitations are assessed as set out below.

#### 1.4 Direct Limitations

- 1.4.1 The agroclimatic data of a site influences the LCA in respect of growing conditions, and the soil reaction in terms of wetness and droughtiness. The overall climatic limitation is assessed using the average annual rainfall and accumulated temperature. It reflects direct effects of water supply and energy available for photosynthesis on plant growth.
- 1.4.2 Gradient has a significant effect on mechanised farm operations since most conventional agricultural machinery performs best on level ground. Microrelief involves complex changes in slope angle and direction over short distances, or the presence of boulders or rock outcrops; all of which can impact upon the use of agricultural machinery.
- 1.4.3 Flooding can affect choice of crops to be grown, because it may have a negative influence on the yield of some crops and restrict soil cultivation. The main factor determining the risk of flooding is topography. Local conditions can be assessed based on local knowledge and information from the water authorities. Floods which occur in summer are generally more damaging than winter floods because the growing roots of the crops are more sensitive to waterlogging. The flood limitation is therefore assessed separately for a 'winter' and a longer 'summer' period (the latter including spring sowing and autumn cultivation).
- 1.4.4 Soil depth is important when determining available water capacity. Shallowness can affect cropping in several ways, such as restricting the range of cultivation methods available and reducing the potential for nutrient uptake and root growth.



1.4.5 Stones act as an impediment to cultivation, harvesting and crop growth. A high stone content reduces the soil water holding and rooting potential, will impact agricultural machinery, and reduce crop quality (i.e., bruising potatoes during harvesting).

## Interactive Limitations

- 1.4.6 The physical limitations resulting from the interactions between climate, site and soil characteristics are soil wetness and droughtiness. Soil wetness limitations adversely affect plant growth or agricultural management (e.g., grazing, trafficking by machinery and poaching by livestock). Droughtiness is most likely to be a significant limitation to crop growth in areas with low rainfall and high evapotranspiration, or where the soil profile holds only small reserves of moisture.
- 1.4.7 For LCA purposes, the soil wetness assessment takes account of duration of time when soil moisture is at field capacity, and soil susceptibility to waterlogging based on the following soil profile characteristics: depth to slowly permeable layer, depth to gleying features (indicating intermittent waterlogging), and topsoil texture.
- 1.4.8 Droughtiness is assessed based on average drought risk of three reference crops, winter wheat, potatoes and barley. The method uses rooting depth and foliar characteristics of the reference crops to estimate soil moisture balance at a given location.
- 1.4.9 A secondary factor, accompanying other more critical limitations such as slope or droughtiness, is erosion caused by wind or water. Soils can be at risk from the loss of topsoil, seeds, seedlings and fertiliser, as well as damage from abrasion to plants, due to wind erosion.

## 2 DESK STUDY

- 2.1.1 Information about the soil resource and agricultural land present in and surrounding the Site was obtained from the following published sources:
  - National Scale Land Capability for Agriculture in Scotland 1: 250 000<sup>2</sup> scale; (National LCA Map)
  - Partial Cover Land Capability for Agriculture Map, 1: 50 000<sup>3</sup> map scale; (Partial Cover LCA Map) and

 <sup>&</sup>lt;sup>2</sup> Natural Scotland (2017) Land Capability for Agriculture. Available at: <u>https://map.environment.gov.scot/Soil\_maps/?layer=5</u>. Accessed August 2024.
<sup>3</sup> The James Hutton Institute (2017) Land Capability for Agriculture (1: 50 000). Available at: <u>https://map.environment.gov.scot/Soil\_maps/?layer=5</u>. Accessed August 2024.



- The 1: 250 000 Soil Map of Scotland created by the Macaulay Institute for Soil Research
- 2.1.2 The Soil Map of Scotland indicates that the soils on the Site are mineral alluvial soils with some peaty alluvial soils.
- 2.1.3 The national scale LCA identifies the majority of the Site as Class 3.2 LCA, with a small section (~20%) of the northern section being Class 2.
- 2.1.4 The more detailed 1: 50 000 Partial Cover LCA data<sup>3</sup> identifies the land as being predominantly Class 2 prime agricultural land. One the western boundary a small section is classed as Class 4.2 and a section on the south eastern boundary includes a very small area of Class 3.1.

## 3 FIELD SURVEY

3.1.1 Soils were investigated at 15 points using a hand auger and this was supported by 2 hand excavated soil pits at survey points 4 and 10 as shown on drawing GL10503/002. This provided a survey density of at least 1 point per ha. Five soil samples from across the site were sent for analytical texture: One bulk sample from survey points 1 and 3 (Topsoil and Subsoil), and from the soil pit on Point 10 (Topsoil, Upper Subsoil and Lower Subsoil). The analytical results are provided in Appendix 2.

#### 3.2 Drainage

3.2.1 A functioning drain (ditch) isolates the site from the runoff generated by the forested area to the east. The northern quarter of the Site sits topographically lower than the rest of the field and drains into a ditch running along the northern perimeter of the site. At the time of the survey, no drainage issues were observed, and no evidence of field drains were found.

#### 3.3 Soils identified during the survey

- 3.3.1 The topsoil depth ranges from 20 to 40 cm in the Northern section of the site (Survey points 1-5) and has a silty loam to medium clay loam texture. This overlays a sandy silt loam upper subsoil that ranged in thickness from 10 cm to 35 cm. The lower subsoil to > 120 is a silt loam to sandy silt loam.
- 3.3.2 The southern half of the site, (Survey points 6 to 15) the topsoil texture is a Silty Loam with a depth ranging from 20 30 cm. At one point along the southern boundary (Survey point 15) the silty loam topsoil depth extends to over 70 cm. This overlays 20



- 50 cm layer of sandy silt to silt loam textured upper subsoil which overlays a sandy silt to clay loam textured lower subsoil to > 120 cm.

- 3.3.3 Across the site the topsoil colour was largely a consistent Dark Brown (10YR/3/3), with a well-developed fine to medium Sub-angular blocky structure. Some mottling was observed in the slightly heavier textured topsoils in the north half of the site but no gleying in the topsoil was found.
- 3.3.4 The variability in the subsoil depth and texture is consistent with the alluvial soils and the main distinguishing characteristic between the upper and lower subsoil layers was the presence of gleying in the lower profiles.
- 3.3.5 Gleying within 40cm of the soil surface was only observed at one point (Survey Point 1) and at all other location where gleying was found it occurred at depths below 40cm.
- 3.3.6 Subsoil textures were generally consistent with those of the topsoil, with medium clay loams present in the northern half, and silty loams in the south.



3.3.7 Figure 1 displays a typical soil profile found onsite.

Figure 1: Typical soil profile observed during the survey (Point 14)

## 3.4 Land capability for Agriculture

## Climate

3.4.1 The nearest reference station is Inverness and is located ~ 30km from the Site and is at a similar altitude. Based on this the maximum LCA for the Site is Class 2 due to climatic limitations.



## Gradient

3.4.2 The Site had an average slope of 0.5% to the north-south and one section has a slope of 3.9% running east-west and gradient is not a limitation on LCA class for the Site.

Soil

- 3.4.3 Soil depth, structure, stoniness and texture are not limiting factors to the capability for agriculture, as at all auger and pit survey points the soil profiles were more than 80cm deep and had only a minor stone content.
- 3.4.4 The Site has an available water capacity of between 150 and 200 mm and an estimated maximum potential soil moisture deficit of 118 mm and it is assessed as being slightly droughty to moderately droughty for wheat and potatoes which is consistent with Class 2 agricultural land.

#### Wetness

3.4.5 Wetness limitations are the result of a three-step process involving (i) Soil Wetness Class, (ii) water retention and (iii) Length of field capacity period. Combined this shows that there is a wetness limitation for survey points 1, 2, 4, 10 and 12 which limits these areas to a maximum LCA of Class 2. At survey point 1 the gleying occurs within 40 cm of the soil and this point has been further downgraded to LCA Class 3.1 as result.

## Erosion and Flood risk

3.4.6 Wind, erosion and flooding were not considered a limitation for the Site.

## 3.5 Overall Agricultural Land Classification

- 3.5.1 The detailed publicly available LCA mapping for the Site showed that a small section of the land falls into areas of Class 4.2 and Class 3.1. The detailed survey found that these areas did not occur within the RLB for the Site.
- 3.5.2 The detailed LCA survey for the Site found that the majority of the agricultural land is Class 2 (13.71 ha) which is limited by climate and wetness. A small area in the north of the site has been classified as Class 3.1 and is limited by wetness.
- 3.5.3 The land across the Site is Prime Agricultural Land which comprises 14.6 ha of Class 2 and Class 3.1 agricultural land. This is shown geographically in *Drawing GL10503/002* A --'Land Capability for Agriculture'.



Table 1: Summary of LCA within the Site Boundary					
LCA	Area (ha)	Percentage (%)			
Class 2	13.71	93.9			
Class 3.1	0.89	6.1			
Total	14.6	100%			

#### 4 POLICY AND GUIDANCE

#### 4.1 National level

#### The National Planning Framework 4

- 4.1.1 The National Planning Framework 4 (NPF4)<sup>4</sup>, published in February 2023, is the national spatial strategy for Scotland. It sets out the spatial principles, regional priorities, national developments, and national planning policy.
- 4.1.2 Policy 5 (a) states development proposals will only be supported if they are designed and constructed: i) in accordance with the mitigation hierarchy by first avoiding and then minimising the amount of disturbance to soils on undeveloped land; and ii) In a manner that protects soil from damage including from compaction and erosion, and that minimises soil sealing.
- 4.1.3 Policy 5 (b) states development proposals on prime agricultural land, or land of lesser quality that is culturally or locally important for primary use, as identified by the Local Development Plans (LDP), will only be supported where it is for: iv) The generation of energy from renewable sources or the extraction of minerals and there is secure provision for restoration; and in all of the above exceptions, the layout and design of the proposal minimises the amount of protected land that is required.

# Getting the best from our land - A land use strategy for Scotland (Published March 2021)<sup>5</sup>

4.1.4 The document provides a broad context for planning authorities on Government policies relevant to land use. Planning authorities are expected to have regard to the Strategy in preparing development plans. The principal policy framework, however, continues to be provided by the National Planning Framework, and decisions should be made in accordance with the development plan unless material considerations

 <sup>&</sup>lt;sup>4</sup> Scottish Government (2023) National Planning Framework 4. Available at: <u>https://www.gov.scot/publications/national-planning-framework-4/pages/3/</u>. Accessed August 2024.
<sup>5</sup> Scottish Government (2021) Land use - getting the best from our land: strategy 2021 to 2026. Available at: <u>https://www.gov.scot/publications/scotlands-third-land-use-strategy-2021-2026-getting-best-land/</u>. Accessed August 2024.



indicate otherwise.

#### 4.2 Local policy

4.2.1 The site falls within the administrative area of the Highland Council. A new local development plan is currently being prepared for Highland and is expected to be adopted towards the end of 2027<sup>6</sup> which will replace existing local development plans. Until this time, the Inner Moray Firth Local Development Plan 2 (adopted June 2024)<sup>7</sup> and the Highland-wide Local Development Plan (adopted April 2012)<sup>8</sup> apply. No policies relevant to soils and agricultural land are included in the Inner Moray Firth Local Development Plan adopted in June 2024.

#### Highland-wide Local Development Plan (adopted April 2012)

- 4.2.2 Policy 28 (Sustainable Design) states that the Council will support developments which promote and enhance the social, economic and environmental wellbeing of the people of Highland. Policy 28 states that proposed developments will be assessed on the extent to which they impact on prime quality agricultural land.
- 4.2.3 Policy 55 (Peat and Soils) of the Highland-wide Local Development Plan states that development proposals should demonstrate how they have avoided unnecessary disturbance, degradation or erosion of peat and soils. Additionally, this policy outlines that unacceptable disturbance of peat will not be permitted unless it is shown that the adverse effects of such disturbance are clearly outweighed by social, environmental or economic benefits arising from the development proposals. Where development on peat is clearly demonstrated to be unavoidable then the Council may ask for a peatland management plan to be submitted which clearly demonstrates how impacts have been minimised and mitigated.

<sup>&</sup>lt;sup>6</sup> The Highland Council (2024) Highland Local Development Plan. Available at: <u>https://www.highland.gov.uk/info/178/development plans/1101/highland local development plan hldp</u>. Accessed August 2024.

<sup>&</sup>lt;sup>7</sup> The Highland Council (2024) Inner Moray Firth Local Development Plan. Available at: <u>https://www.highland.gov.uk/downloads/file/28837/inner moray firth local development plan 2 strategy</u> <u>and general policies</u>. Accessed August 2024.

<sup>&</sup>lt;sup>8</sup> Highland-wide Local Development Plan (2012) Highland-wide Local Development Plan. Available at: <u>https://www.highland.gov.uk/info/178/development\_plans/199/highland-wide\_local\_development\_plan</u>. Accessed August 2024.



APPENDICES



## APPENDIX 1 : Land Classification For Agriculture (Drawing GL10503/002)



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<u>KEY</u>						
Site Boun	dary					
Land Capability for	or Agriculture					
Class 2						
Class 3.1						
Auger Co	re					
Profile Pit	v for Agriculturo	Aroa (ba)	. I			
Class 2	y loi Agriculture	13 71 ha	1.1			
Class 3.1		0.89 ha				
			-			
Notes:						
Boundaries are i	ndicative Aerial im	agery show	yn for			
context purposes o	nly.	agery show				
REVISION	DETAILS	DATE DR	AWN CHKD APPD			
CLIENT		11				
TNEI						
INE						
PROJECT						
	BEAULY BESS					
DRAWING TITLE						
BEAULY						
DRG No. GL105	03/002	REV SU	JIT. CODE			
DRG SIZE	SCALE 1:3 000	DATE 27/08/2	2024			
DRAWN BY SRW	СНЕСКЕД ВУ ВС	APPROVED BY				
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	metrop	く 服装				
	I I SU OI S	5 🗒	<b>新新</b>			



**APPENDIX 2 : NRM Soil Test Results** 



			ANALYTI	CAL REPORT		
Report Number	45063-24 H448		WARDELL ARMSTRONG LLP			Client
Date Received	26-JUL-2024		CITY QUADRA	NT		
Date Reported	13-AUG-2024		11 WATERLOC	SQUARE		
Project	GL20503		NEWCASTLE U	JPON TYNE		
Reference	SILVIA ARPANO		NE1 4DP			
Order Number	PO GL1580					
Laboratory Reference			SOIL705519	SOIL705520	SOIL705521	
Comula Defense		-	BEAULY UPPER	BEAULY TOP	BEAULY SUB	
Sample Reference			SS 10	SOIL 1,3	SOIL 1,3	
Determinand	Unit	-	SOIL	SOIL	SOIL	
pH water [1:2.5]		-	6.3	6.6	6.0	
Sand 2.00-0.063mm	% w/w	-	49	12	77	
Silt 0.063-0.002mm	% w/w	-	36	72	15	
Clay <0.002mm	% w/w	-	15	16	8	
Textural Class **		-	SZL	ZL	LS	
Notes				•		
Analysis Notes Document Control	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated. This test report shall not be reproduced, except in full, without the written approval of the laboratory.					
	** Please see the attached document for the definition of textural classes.					
Reported by	Teresa Cyne Natural Resource Management, a trading division of Cawood Scientific Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS Tel: 01344 886338 Fax: 01344 890972 email: enquiries@nrm.uk.com					





## **ADAS (UK) Textural Class Abbreviations**

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	С
Silty clay	ZC
Sandy clay	SC

For the *sand, loamy sand, sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

- vf Very Fine (more than 2/3's of sand less than 0.106 mm)
- f Fine (more than 2/3's of sand less than 0.212 mm)
- c Coarse (more than 1/3 of sand greater than 0.6 mm)
- m Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam classes* according to clay content are indicated as follows:

- M medium (less than 27% clay)
- H heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter  $\mathsf{P}.$ 







			ANALYTI	CAL REPORT					
Report Number	45064-24	H448	H448 WARDELL ARMSTRONG LLP		Client SA-GL2	0503-001			
Date Received	26-JUL-2024		CITY QUADRANT			GL10538	3		
Date Reported	14-AUG-2024		11 WATERLOO SQUARE						
Project	SA GL20503 001		NEWCASTLE U	JPON TYNE					
Reference	GL10538		NE1 4DP						
Order Number	PO GL1580								
Laboratory Reference			SOIL705524	SOIL705525					
Comula Defense			BEAULY TOP	BEAULY LOWER					
Sample Reference			SOIL 10	S/S 10					
Determinand	Unit	-	SOIL	SOIL					
pH water [1:2.5]			6.8	6.2					
Available Phosphorus (Index)	mg/l		2.6 (0)	7.8 (0)					
Available Potassium (Index)	mg/l		40.7 (0)	74.1 (1)					
Available Magnesium (Index)	mg/l		87.8 (2)	117 (3)					
Sand 2.00-0.063mm	% w/w		39	43					
Silt 0.063-0.002mm	% w/w		43	40					
Clay <0.002mm	% w/w		18	17					
Organic Matter LOI	% w/w		1.3	5.9					
Textural Class **			MCL/SZL	SZL					
Notes									
Analysis Notes Document Control	Notes   The sample submitted was of adequate size to complete all analysis requested.     The results as reported relate only to the item(s) submitted for testing.     The results are presented on a dry matter basis unless otherwise stipulated.     nt Control   This test report shall not be reproduced, except in full, without the written approval of the laboratory.								
	** Please see the attac	ched document for the definition	on of textural clas	ses.					
Reported by	Teresa Clyne Natural Resource Mar Coopers Bridge, Brazi Tel: 01344 886338 Fax: 01344 890972 email: enquiries@nrm	nagement, a trading division of iers Lane, Bracknell, Berkshire .uk.com	Cawood Scientif , RG42 6NS	ic Ltd.					





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Silty clay	ZC
Sandy clay	SC

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Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter  $\mathsf{P}.$ 





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