LOGAN PM
Energy Project Management

Supporting Document,
Dyce Energy Storage

A report to

Aberdeen City Council

Issue	Reason
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Document prepared for

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1 INTRODUCTION

1.1 The application

This document supports an application to Aberdeen City Council by Intelligent Land Investments Group plc for consent under the Town and Country Planning (Scotland) Act 1997 for construction of a battery energy storage system at Raiths Industrial Estate, Kirkton Road, Dyce AB21 0BG. The proposal is described as Dyce Energy Storage.

The application seeks consent for the installation of an energy storage system with a generating capacity of up to, and not exceeding, 50 megawatts. The development would consist of containers containing batteries, associated equipment, an access track, electricity meter building, fencing and security. Figures 1 and 2 show the site location and layout.

1.2 Site description

The proposed development site is a currently vacant plot within the industrial estate, adjacent to other industrial units and to the boundary of Aberdeen Airport. Immediately to the north is farmland. The development would be accessed from an existing access on Kirkton Road.

The site lies around 1.5km north west of the town of Dyce. The nearest dwellings are around 200 metres from the proposed plant, on Pitmedden Road, and around 400 metres to the north at Dyce Drive and Pitmedden Road.

The Dyce – Kintore railway lies around 200 east of the site.

2 PROJECT DESCRIPTION

2.1 Introduction

This section describes the proposed development in terms of its physical elements and in terms of the construction process.

The area of the red line boundary is 0.9 hectares.

2.2 Design

The project has been designed to give efficient and effective operation, and acceptable and minimised local impacts.

The location is close to the existing grid substation providing for efficient operation whilst giving suitable separation from residents. The set back from the road and screening allow for minimal visual and other impacts on residents. The site entrance provides suitable road safety.

The site layout has been developed to give a compact footprint assisting efficiency and minimising the land take. Standard container units allows maximum efficiency and effectiveness by allowing final selection of internal equipment at late stage in an area where battery technology is progressing rapidly.

2.3 The development

The grid battery energy storage system will comprise batteries housed in steel containers, associated electrical equipment, access tracks, electricity meter building, fencing and new planting. The generation capacity will be up to, but not exceeding, 50 megawatts.

Containers

Batteries will be housed in steel containers of 13 metres by 2.5 metres by up to 3.5 metres high. Cooling units will be situated at low level on the side of the containers. The colour of the containers would be agreed with Council Planning, hollybush green is proposed (BS 14-C-39).

Power converters

Banks of power converter cabinets will sit within the site to switch between alternating and direct current. These will have a height of up to 3.5 metres.

Transformers

There will be an electrical transformer beside each power converter group, with height of up to 3.5 metres.

Entrance and Tracks

The site would be accessed from Kirkton Drive, off Pitmedden Road, by an existing modern and recently built access, a distance of around 60 metres from the public road. The access slopes down from the existing access road so no additional surface water would enter the public road. Within the site, a running surface would be formed of aggregate on permeable geotextile.

Electricity meter and switch enclosure

A structure is required to house electricity metering, switchgear and control equipment and health & safety equipment. This would be a prefabricated GRP buildings of around 13 metres by 6 metres by 3.5 metres high. The colour would be agreed with the Council, hollybush green is proposed (BS 14-C-39).

Equipment store

Two metal containers, being 12.2 by 2.5 metres by up to 3 metres high, are proposed to house spares and health and safety equipment.

Parking

No staff will be based at the site. Parking will be available for visiting maintenance personnel.

Electrical connection

The project would be connected to the existing Dyce grid substation by underground cables.

Fencing, security, lighting

A mesh fence of 3 metres in height with barbed wire top would be employed at the entrance to the main compound and at the north end of the site (see site plan). Note that the west, east and south sides of the site, towards the airport and industrial units, have existing security fences.

Security cameras will be employed around the development on metal poles of 4 metres height and two cameras per pole.

The site will not employ dusk to dawn external lighting. Infrared security lighting may be used. External lighting will be provided for use infrequently by maintenance staff when on site. Lighting will be designed with consideration of the adjacent airport.

Profiling

Some profiling of the existing ground levels is proposed to slightly lower the south west part of the site.

Sustainable drainage

A sustainable drainage scheme is proposed in line with planning policy. All of the site tracks and hardstandings are proposed as permeable aggregate allowing natural infiltration.

Certain engineering and technical details can only be finalised on award of procurement and construction contracts. These details may vary according to the specific battery, inverter and containers used, and would not significantly increase the impacts described.

The installation would be in accordance with current regulations and practices including the Electricity Safety, Quality and Continuity Regulations 2002 as amended.

2.4 The construction process

The start of construction would depend on the Planning process, and on procurement and construction management activity. The on-site construction period is estimated to be 9 months covering three phases:

Ground works

- clear site, earthworks
- construct access track and hardstanding
- sustainable drainage scheme
- construct fencing
- trench and lay cables
- prepare foundations

Installation

- deliver & install components including battery containers & enclosures

Commissioning

- electrical connections
- commissioning (checking and setting in operation)

Concrete for the foundations will be imported ready mixed.

2.5 Battery safety

Lithium ion batteries are accepted in our homes, workplaces and in our pockets, in laptop and tablet computers, mobile phones, uninterruptible power supplies, and increasingly in cars. We accept some risk with all technology and batteries are no different. We cannot eliminate all risk, but it can be reduced to an acceptable level and designed to limit the consequences of an event. This facility will be a fixed installation, designed around safety.

2.6 Battery recycling

The developer undertakes to remove from site and recycle at a licensed facility, any battery unit that reaches the end of its operational life.

3 CLIMATE CHANGE IMPACT

The function of the battery energy storage facility is to absorb energy from the national electricity grid at times when there is an excess (and it is relatively cheap) and provide it back to the grid at times when it is scarce (and more expensive). The result of this function is to replace high carbon electricity sources with low carbon electricity sources, and to facilitate increased adoption of intermittent renewable energy sources – in the UK these are chiefly wind and solar power.

The National Grid states “Battery storage technologies are essential to speeding up the replacement of fossil fuels with renewable energy.”[1]

A further result is that by replacing higher cost electricity with lower cost electricity, the average price of electricity will be reduced. The Carbon Trust found £2.4bn per year could be saved by increased storage by 2030[2].

Without increased electricity storage in the UK, decarbonisation of the UK electricity grid cannot happen. Keeping the electricity grid functioning requires the supply of electricity to match the demand for electricity, minute by minute throughout the day and night. Demand varies as machinery, heating, lighting and appliances are turned on and off and is generally higher in the daytime before peaking in the early evening and then falling at night. Currently, fossil fuel generation is used to help match supply and demand because its output can be scheduled in advance (unlike wind and solar).

The complexity of the UK's electricity grid where multiple generators bid into a national pool hour by hour means that it is hard to give definitive carbon reduction figures in advance for this project. Times when the battery is absorbing power will be when there is an excess of power on the electricity grid. For cost and emissions reasons, fossil fuel generators are unlikely to be operating at these times. In contrast, the times when the battery output is needed to support the grid will generally be times when fossil fuel generators, electricity from coal, gas and oil, will be most likely to be running. Power from the battery facility displaces power from these 'dirty' sources.

[1] https://www.nationalgrid.com/stories/energy-explained/what-is-battery-storage accessed November 2021

[2] https://www.carbontrust.com/resources/energy-storage-report-can-storage-help-reduce-the-cost-of-a-future-uk-electricity-system accessed November 2021

So battery energy storage is not a renewable source of energy, but it acts to reduce the carbon emissions of the existing electricity system, and to permit increased use of lower cost intermittent renewable generation (wind and solar power).

4 LOCATION JUSTIFICATION

A national need for increased energy storage has been established. The UK is moving away from carbon intensive fossil fuels towards low carbon sources. One aspect of this is an increasing need for energy storage, in combination with developments in energy storage technology, to assist in cost-effectively matching supply and demand on the electricity grid. The degree of storage on the electricity grid directly influences the amount of intermittent renewable energy sources that can be accommodated.

The project requires to be sited close to an existing substation with suitable electrical connection capacity. The site has been chosen because it fits this criteria and is considered to have acceptable impacts in terms of amenity and other impacts.

The Scottish Energy Strategy, published 2018, supports new energy storage capacity. It states that the Scottish Government will continue to support innovation and deployment in storage and to work to accelerate its penetration across Scotland.

This proposal has been designed carefully and screening included to be appropriate to the location.

The site is on industrial land. The land is designated as Business and Industrial Land (B1) for Economic Development under the Aberdeen Local Development Plan 2017. There is therefore a reasonable expectation that this land will be developed. The use of this land has been minimised by a dense design.

This proposal is for a low carbon energy scheme that fits with the Council's support for energy innovation, investment and infrastructure. The site has been selected and designed to appropriately avoid, minimise and mitigate impacts from the proposed development.

5 VISUAL IMPACT

The project site was chosen to be suitable land and reasonably close to the existing electricity substation. The site is part of the existing industrial estate and adjacent to the airport runway. It is considered that the project will have only minimal visibility from any dwelling, garden ground or public road beyond the immediate industrial estate.

The site is visible from Dyce Drive around 600 metres north west of the proposed site across fields. The facility will be less tall than the existing adjacent structures on the industrial estate and so will not be significantly visible.

Passengers on aircraft using the airport may see the facility in the course of landing or taking off. Given the industrial estate context, the visual impact is considered negligible.

Overall, the visual impact is considered negligible and compatible with its surroundings.

6 HISTORIC ENVIRONMENT & ARCHAEOLOGY

Existing cultural heritage records were reviewed including Pastmap, Canmore, Historic Environment Record, scheduled monuments, and listed buildings.

Whilst there are some records in the surrounding area, the site itself had no records. The site is understood to have been put to rubble at the time of neighbouring developments.

It is considered that no significant cultural heritage impacts would occur associated with this development.

7 ECOLOGY & ORNITHOLOGY

The site is industrial land that is understood to have been previously cleared.

A Preliminary Ecological Appraisal has been carried out for the site, see separate document.

The site trees have been assessed as part of this appraisal as small immature trees with no bat roost potential and not requiring further tree survey. It is nevertheless proposed to retain some small trees on the southern boundary to give some landscaping and habitat in the area and appropriate measures to protect these trees during construction are proposed.

The habitat and plants on the site are common and it is found that the impact due to the development would be negligible.

8 AIRPORT ISSUES

The site is adjacent to Aberdeen Airport and the design has considered compatibility with airport operational issues.

Contact was made with the airport safeguarding team and LoganPM understands that the proposal does not conflict with any airport safeguarding criteria.

It is proposed that a bird hazard management plan be agreed with the Council in consultation with the airport prior to works on site. It is understood that the proposed meadow area will not be attractive to the species of interest to the airport however this would be reviewed in the bird hazard management plan. The plan will include details of the bird risks associated with construction phase, a dispersal threshold of 5 gulls on site at once during construction phase, control measures and dispersal techniques to be used, attendance of bird contractor during soil stripping and contact protocol to be established between the Airside Operations team and the bird contractor and developer.

Lighting on the site will generally be off and only be rarely used when maintenance personnel are on site in darkness and will be designed shine down and not to cause confusion, glare or dazzle to pilots, following the principles of Safeguarding of Aerodromes Advice Note 2 *Lighting near Aerodromes*, published by the Airport Operators Association in association with the Civil Aviation Authority, 2016.

9 FIRE AND RESCUE ISSUES

As a fixed installation, constantly monitored, the site will enjoy a high degree of safety.

Consultation was made with the Scottish Fire and Rescue Service fire engineer and no specific comments were received.

The developer will liaise with the Scottish Fire and Rescue Service prior to construction of the facility with a view to coordinating incident plans.

10 NOISE

This section considers the potential noise impacts from this proposed development.

10.1 Assessment method

A noise model has been prepared for the proposed development following the standard calculations in ISO 9613-2:1996 and BS4142:2014 using standard techniques. Noise limits are proposed for the development.

10.2 Sources of noise

The development will comprise large batteries, inverters, switchgear and transformers on the site. Containers will have air conditioning units mounted at low level on their outsides. Equipment may operate at any time of day or night. Cooling will be designed for the most onerous case, being hot daytime summer conditions, however the greatest use of the facility is expected to be in winter during the day and early evening, from breakfast time to dinner time, so worst case combination of hot weather and high load are expected to be rare.

Measured data from an operational grid battery storage site with equipment functioning was used to derive source sound power data for the battery unit. Note that the battery unit noise data includes its cooling units, that is the noise of the cooling units is included within the levels shown in Table 7.1. Indeed the noise from the battery units principally derives from the cooling units. Overall noise data for the inverter was available and octave band data was taken from a fan unit considered a suitable comparator. Measured data from a comparable transformer was used to model the transformers.

Equipment	Number of units	Sound power levels, dB, at octave band frequencies in hertz								dB A weighted total for one unit
		63	125	250	500	1k	2k	4k	8k	
Energy storage unit (ESU)	52	74	74	78	79	77	75	70	66	82
Inverter	65	53	70	79	79	77	78	75	72	84
Transformer	13	72	74	70	69	58	51	46	40	68

Table 7.1: Sound Power Data

The battery and inverter equipment would not be tonal or intermittent in a way that was considered to be perceptible at the distance of the nearby receptors. Therefore no Rating penalty was applied to the battery and inverter noise levels. The battery units incorporate mitigation within their design – noise attenuation cowls fitted to vents and low-noise multi-bladed fans on the air conditioning units which are sited at low level to minimise noise emissions.

The transformer noise has a tone that is clearly perceptible and therefore a Rating penalty of 4dB has been applied. The Rating penalty has been added, in line with standard methods, in calculating the predictions at nearby receptors (presented in Table 8.2 below).

The worst cast assumption is made that all plant operates continuously and so the maximum noise levels due to the facility will be the same at different times of the day and week and when averaged over different time periods.

For procurement and engineering reasons, it may be necessary to vary slightly the proposed equipment during or after the planning application process. In the event that alternative equipment is proposed that would give greater noise impacts at the receptors, then a full noise assessment would be undertaken in consultation with the

Council Environmental Health Officer for approval prior to proceeding with that alternative equipment.

10.3 Receptors & results

The development site is a relatively noisy environment, adjacent to Aberdeen Airport, within 200 metres of the railway line, and significant noise from nearby roads.

The closest dwellings to the proposed development are at Ivanhoe and the Paddock, around 220 metres east of the proposed facility. The Mews lies on Pitmedden Road around 270 metres east of the site, with no line of sight due to the intervening industrial unit. The Pinehurst Lodge Hotel lies off Pitmedden Road around 350 metres east of the site. Some dwellings, including Kirkton Villa, are situated on Dyce Drive / Old Pitmedden Road around 400 metres north of the site.

Aberdeen City Council publishes noise contours for the airport in Map C of Technical Advice Note “Planning and Aberdeen Airport of September 2015, based on measured noise levels from 2006, presented as average summer daytime noise levels LAeq,16hours. Noise mapping for the Scottish Government for the Environmental Noise (Scotland) Regulations 2006 predicts noise levels shown in the table below at nearby properties, consolidated predictions for airport, road and railway noise, interpolated where appropriate.

These sources were used to give estimates of the existing noise baseline at nearby receptors, shown in Table 8.1 below.

	From Aberdeen Council Technical Advice Note (aviation noise)	From Scottish Government consolidated noise mapping (air, road and rail noise)	
	LAeq,16h	L_{DEN} dB	L_{night} dB (23h-07h)
Ivanhoe	59	65	55
Paddock	59	65	55
The Mews	60	66	56
Pinehurst Hotel	59	63	52
Kirkton Villa	62	63	53

Table 8.1 Baseline noise levels at nearby receptors

These levels indicate existing major adverse noise impacts at these properties. Indeed the existing guidance states that new residential development in these locations “will be refused due to the inability to create an appropriate level of residential amenity.”

A noise model was constructed using standard software to predict noise levels for each nearby dwelling due to the equipment. The results are presented in Table 8.2 below.

	Predicted noise Rating level due to energy storage facility, dB LAeq,15 mins, all times
Ivanhoe	32
Paddock	30
The Mews	25
Pinehurst Hotel	25
Kirkton Villa	34

Table 8.2 External noise predictions

Internal noise levels due to the proposed facility were assessed for bedrooms for the night time period for each receptor, assuming windows open for ventilation, using the Noise Rating NR scale and including for first floor where relevant. Levels were below NR25 for bedrooms in all cases.

The facility will generate some noise and this may be at any time. The predicted levels are well below existing prevailing levels and there is no potential for disturbance at nearby properties.

It is not considered that the proposed development has the potential to cause noise nuisance.

11 TRANSPORT STATEMENT, ROAD SAFETY AND ACCESS

The site has an existing industrial access road. This would be taken into the site with provision for HGV vehicle to turn within the site. The site slopes down into the site from the existing shared tarmac industrial access and so no surface water drainage currently enters the public road from the site and this will not change under the proposal.

Within the site, the new track will be formed with a running surface of aggregate on permeable geotextile.

In use, the development will be associated with very low traffic flows.

Construction will involve taking construction machinery to site, delivery of aggregate for the site track, delivery of site components including the battery containers and other equipment and materials, a mixture of light commercial and HGV loads.

No staff will be based at the site. Maintenance operatives will remove waste generated off site for recycling or disposal. Therefore no refuse vehicle service is needed. The site access nevertheless allows for HGV vehicles to turn within the site. Swept path assessment for large articulated HGV vehicles has been performed and is presented. There is suitable access for fire appliances to the site. The existing roads are over 4 metres wide and there is place to turn an appliance.

Parking will be provided within the site for visiting maintenance personnel.

It is not considered that the project will generate significant traffic and a travel plan is not considered appropriate.

There is no current public access on the land which is industrial land. So no change to existing public access is proposed.

12 DRAINAGE ASSESSMENT AND DESIGN

The site is not situated in an area of flooding as identified by the SEPA flood maps.

A sustainable drainage system would be provided in accordance with local and national policies. The site will not increase the risk of flooding elsewhere.

A retention / infiltration pond is proposed on the lowest part of the site to capture storm surface water and allow this to infiltrate. Most of the development site will remain permeable.

A sustainable drainage system has been designed in accordance with local and national policies, the site will not be subject to flooding, and the site will not increase the risk of flooding elsewhere.

13 CONCLUSIONS

An energy storage system is proposed on the project site and would provide a useful contribution to national energy and carbon reduction targets, grid stability, local energy generation and agricultural diversification. The project will provide employment during construction and ongoing value added in operation and maintenance and contribute local authority rates.

The project has been assessed against a range of potential issues, and impacts have been found to be acceptable.

The development accords with the development plan and is recommended for approval.