NW4 0705 09
Item 5 App C

RWE
The energy to lead

SSA Nominations
Bay 128
Department of Energy and Climate Change
1 Victoria Street
London
SW1H OET

Your ref
Our ref 090326 DECC KL
Name Alan Smith
Phone 01793 892065
E-Mail alan.smith@rwenpower.com

26 March 2009

CNPO Support Letter for Nuclear New Build at Kirksanton

Dear Sir/Madam

This letter is intended to fulfil the requirement for a CNPO to support the nomination of the Kirksanton site and surrounding land into the SSA process.

In its publication inviting nominations under the SSA, the Government defined a CNPO as one which currently operates a nuclear power plant anywhere in the world; and currently operates an electricity generating station subject to UK health, safety and environmental regulation.

This letter presents RWE npower's credentials as a CNPO in the context of its support for the nomination of sites into the Government's SSA process.

RWE npower, a wholly owned subsidiary of RWE AG, is an integrated energy business, generating electricity and supplying gas, electricity and related services to customers across the UK. We own and operate one of the largest and most diverse portfolios of power generating plant in the UK including over 10 GW of large gas, coal and oil-fired power stations and cogeneration plant.

RWE npower is committed to the development of new nuclear build and plans to invest in, develop and operate new nuclear power stations in the UK. Our status as a CNPO has already been recognised by the Government as an acknowledged supporter of the candidate reactor designs, including Areva's EPR and Westinghouse's AP1000, currently going through the Generic Design Assessment Process.

The Kirksanton site is of sufficient size to accommodate the construction of at least one power station of either of the above technologies, and is viewed as a technically suitable site. RWE npower has applied for a 3.6GW grid connection agreement to export power from the site. Accordingly, a new nuclear power station is capable of being deployed at Kirksanton before 2025.

RWE currently operates five nuclear reactors located across three sites in Germany. Together the company's nuclear plant generates 25 per cent of the annual power produced by its German power station fleet. RWE has more than 45 years' experience of operating nuclear plant, and managing waste, to the highest safety standards.

Our nuclear stations have served as reference plants for national research and development projects, including research into best practice in the management of

RWE npower

Trigonos
Windmill Hill Business Park
Whitehill Way
Swindon
Wiltshire SN5 6PB

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F +44(0)1793/89 25 25
I www.rwenpower.com

Registered office:
RWE Npower plc
Windmill Hill Business Park
Whitehill Way
Swindon
Wiltshire SN5 6PB

Registered in England
and Wales no. 3892782

safety and risk. The company's record in nuclear operations is recognised world-wide and RWE is an active member of a number of international associations working to improve and enhance the nuclear generation industry.

RWE has the financial strength and partnering experience we believe is essential to develop new nuclear build. RWE Group's external revenue for the 2008 financial year was €49 billion, EBITDA was €8.3 billion and its operating result €6.8 billion. At the end of 2008 the Group's workforce numbered 65,908 employees. RWE has an excellent, proven track record of partnering with other companies both in the UK and internationally. In Germany, we have substantial joint ventures with E.ON on three of our nuclear power plant units and with Steag, Vattenfall Europe and E.ON on two of our coal-fired power stations. This is complemented by our established UK power station technical and project management competences and our recent experience of consenting and planning major coastal site and inland power stations.

In short, RWE npower has demonstrable capability to finance, engineer, plan, procure and construct a nuclear power station, and to licence and operate it within the UK's health and safety, security and environmental regulatory regime.

Should the Government require further information about RWE or this letter of support, please contact myself in the first instance.

Yours Sincerely,

Alan Smith
Project Manager
UK Nuclear Development Team
RWE npower
Windmill Hill Business Park
Whitehill Way
Swindon
SN5 6PB

Supplementary information

Statement to support section A4 on Community Awareness Raising

1. Introduction

This supplementary information contains details on the range of activities carried out to raise awareness for the nomination of land at Kirksanton among a number of key audiences, as required by section A4 of the Government's nomination form and the associated guidance. Methods utilised included; face to face meetings, direct communication, paid for advertising, media relations and public drop-in sessions. These have been supported by a phone information line, facts leaflet, email address and references as required to Government information.

2. Criterion

In relation to the Government's SSA process the criterion in section A4 requires that a statement is included within the nomination to set out the steps that have been taken to raise awareness of the nomination with local communities living in the vicinity of the site, including landowners. For the purposes of the nomination, this supplementary section provides this statement.

Specifically, the SSA guidance sets out that before a site nomination is made, a nominator (or a third party) should have:-

- made the local authority, RDA (Regional Development Agency) and any landowners aware of the nomination
- taken steps to publicise their nomination to the wider community through advertisements in local newspapers, and included in such advertisements the fact that information on how to have your say can be obtained from a Government website www.nuclearpowersiting.decc.gov.uk
- considered raising awareness with the existing site stakeholder group in the case of existing nuclear sites
- considered discussing awareness raising plans with the relevant local authority / authorities.
- made available the leaflet New Nuclear Power Stations: How sites will be chosen and how you can have your say (or referred attendees to the leaflet via the Government's website www.nuclearpowersiting.decc.gov.uk).

3. Community Awareness Raising – Statement of work undertaken

3.1 Awareness raising strategy

The awareness raising strategy was designed to ensure that the stakeholder engagement would meet the requirements of government policy.

Key elements of local awareness raising were through a public SSG meeting and local drop-in exhibitions at which members of RWE's nuclear team were on hand to answer questions about the Government's SSA process and to explain the company's interests in Kirksanton. A number of letters were sent to the local community, key stakeholders and the SSG. Please refer to Appendix 1 for copies of these letters.

Turning to the SSA awareness raising requirements set out in section 2 above, and taking each of the points in turn:

3.2 Local government

RWE has entered into dialogue with the local authority (Copeland Borough Council), Cumbria County Councils and the most relevant parish councils, regarding the sites at Sellafield, Kirksanton and Braystones. The dialogue appraised the bodies of RWE's interests and the SSA process. As a result of this dialogue RWE held two public meetings.

3.3 RDA

The RDA were notified of the nomination in a letter dated 26th March 2009 and included a copy of a letter sent to local householders.

3.4 Landowners

Correspondence has been sent to landowners and immediate neighbours informing them of the nomination. A template copy of the letters sent to landowners (a pre-requisite to making a nomination) sent on 23rd March 2009 is included within Appendix 1.

3.5 Community awareness raising

Community awareness raising included:

- Hand delivered letters to householders within the local community
- Exhibitions and SSG
- Newspaper advertisements (Appendix 2)
- Press releases to local media about the 'drop in' meetings and information available (Appendix 2)

Further press coverage relating to the Kirksanton nomination included RWE's grid connection (Appendix 3).

3.5.1 Hand delivered letters to householders

Approximately 40 letters, informing recipients of the drop in meetings, were delivered by hand to homes within the local community on the 13th March 2009. The letters contained information about the Government's SSA process, notification of the nomination at Kirksanton, a copy of the Government's leaflet, details of the forthcoming exhibitions, details of RWE's phone telephone number, the Government's web address and an email address. A copy of the letters are included within Appendix 1 together with The Department for Energy & Climate Change (DECC) leaflet which accompanied it, ***New Nuclear Power Stations: How sites will be chosen and how you can have your say***.

3.5.2 Exhibition

Bespoke exhibition panels outlined the SSA process as well as providing an indication of the timeline for the development of new nuclear power stations were displayed at the drop in meeting. These

panels referenced the opportunities for people to have their say to Government. Further exhibition panels included a location map, as well as an indicative draft outline of the proposed nomination site.

Information packs designed specifically for these events were available for people to take away along with copies of The Department for Energy & Climate Change (DECC) leaflet, ***New Nuclear Power Stations: How sites will be chosen and how you can have your say***.

Feedback forms were also made available to attendees at the drop in sessions.

3.5.3 Advertising

Newspaper advertising for drop in meetings were covered in the local newspapers. The advert was designed to raise awareness that the Kirksanton site was to be nominated, and included details of the exhibitions, phone number and email addresses. Copies of the newspaper adverts are included in Appendix 2, and the publication dates are set out below.

Local Press Advertising
Whitehaven News 19th March
North West Evening Mail 19th March
Workington (West Cumberland) Times & Star 20th March

3.6 West Cumbria Site Stakeholder Group

A public meeting of the WCSSG was held on the 18th March in Whitehaven and the SSA process was discussed and a presentation made by West Lakes Renaissance. Prior to the meeting letters were sent to the SSG members and key stakeholders informing them of the meeting. The SSG informed attendees of the intention to nominate the Sellafield, Kirksanton and Braystones sites, and RWE were in attendance to answer questions at the meeting.

3.7 Discussion of awareness raising plans with the local authority / authorities

RWE wrote to the local authorities on 13th March 2009 confirming the intention to nominate land at Kirksanton into the SSA process and its plans for public engagement.

RWE met with and presented to the Millom Town Council on March 25th, as well as providing a drop-in meeting at Millom Network Centre. There was also a public meeting and drop-in meeting on March 24th in Kirksanton.

3.8 Making available the Government's leaflet

Copies of the Government's leaflet were included with the letter that went to householders, and this was then copied to the various statutory and non statutory bodies. The leaflet was also made available at the exhibitions and could be downloaded via the Government's website.

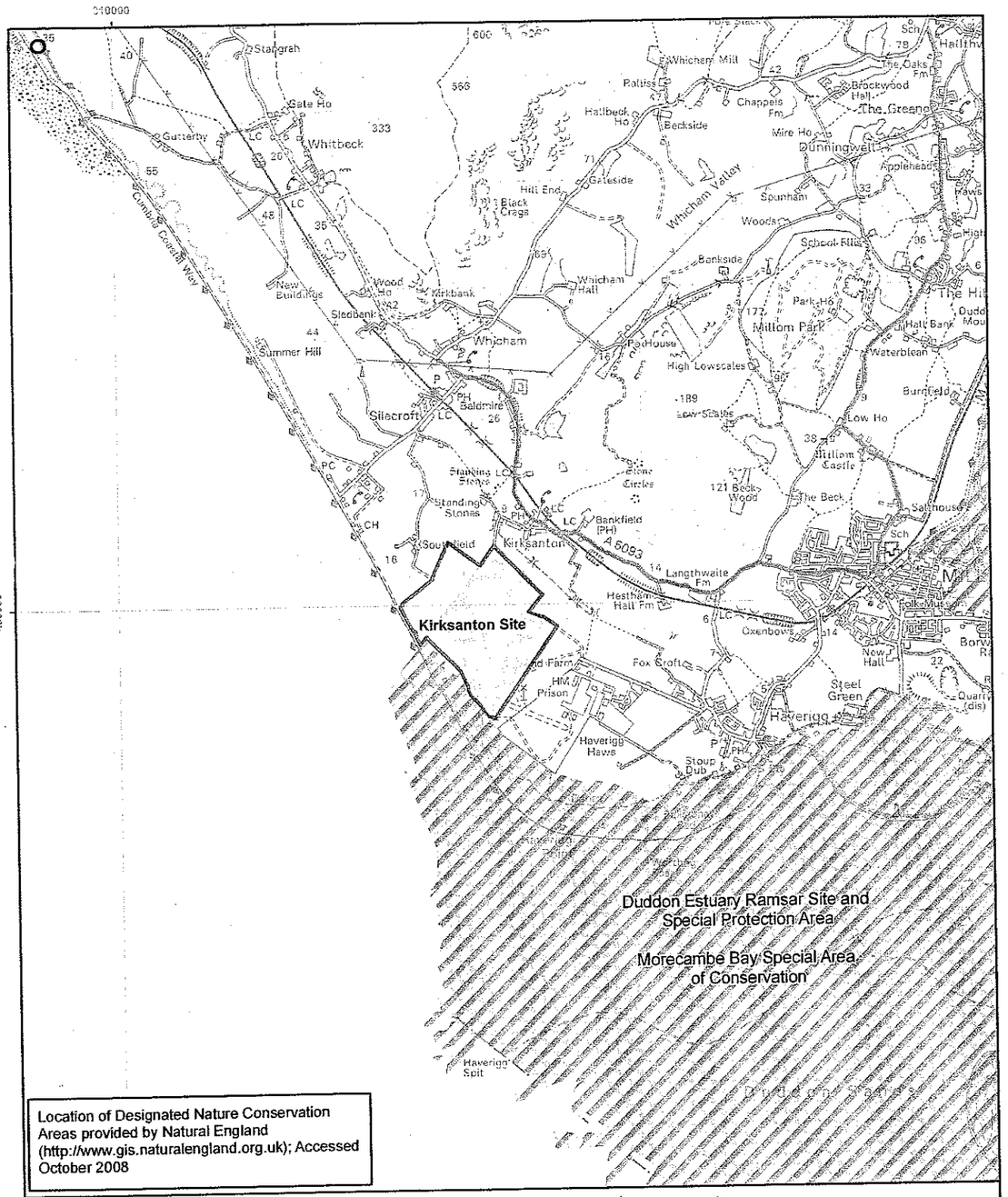
3.9 Other points to note

3.9.1 Website and phone number

The Government's website was promoted within the various communication materials. The provision of a telephone number and an email address were also promoted and were intended as an additional measure to provide a wider means of communication.

4. Conclusion

It is believed that this nomination meets the requirements of section A4 of the nomination form and guidance.



Location of Designated Nature Conservation Areas provided by Natural England (http://www.gis.naturalengland.org.uk); Accessed October 2008

Legend

- Kirksanton Site
- Ramsar Sites
- Special Protection Areas
- Special Areas for Conservation

Metres 0 625 1,250 2500

Client
RWE Npower Plc

Job Title
Kirksanton Site Nomination

Drawing Title
Internationally Designated Sites of Ecological Importance

Issue	Date	By	Chkd	Appd
P1	31/12/08	IDR	IDR	

ARUP

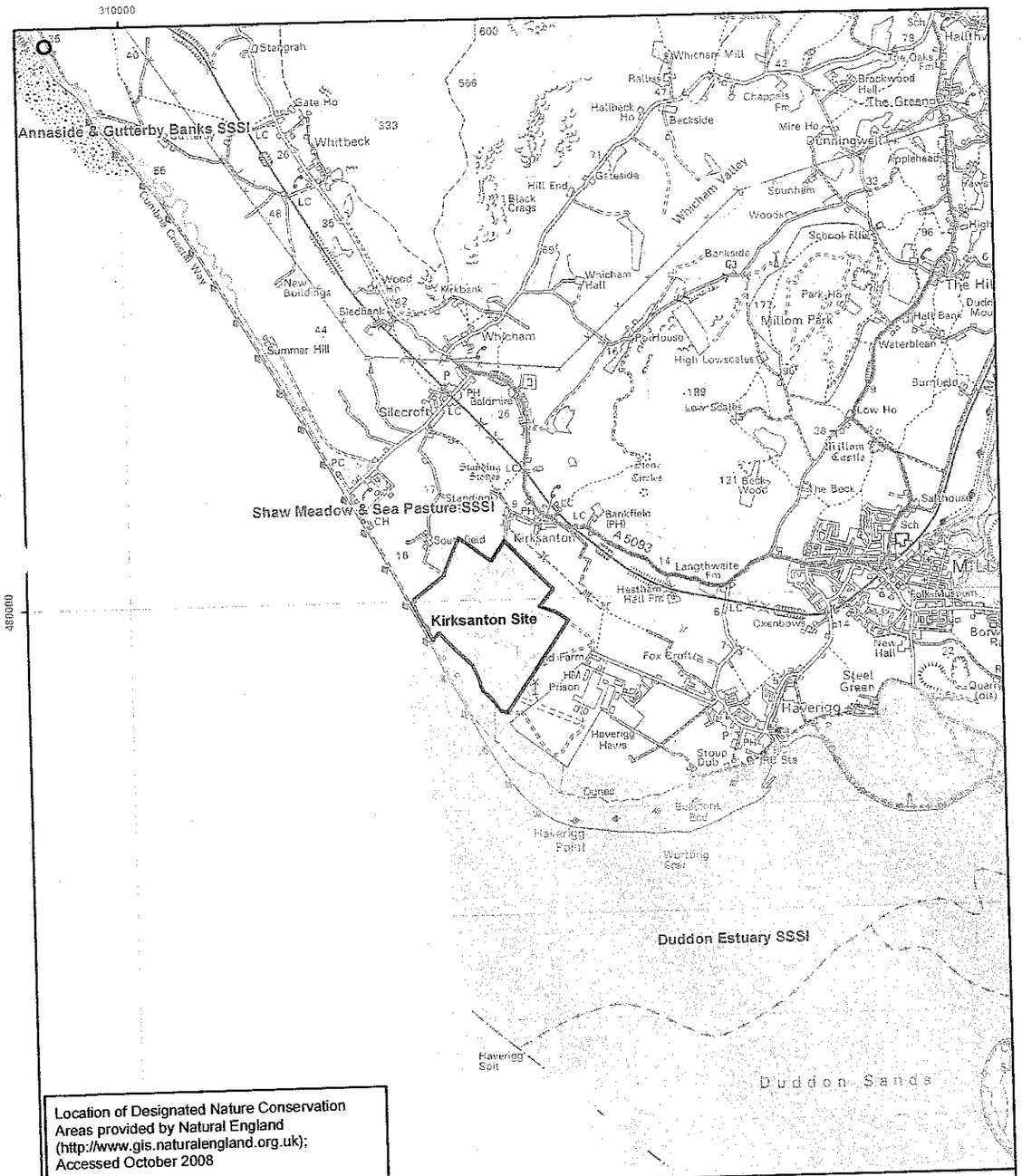
Arup Nottingham
3rd Floor The Frontage, Queen Street, Nottingham. NG1 2BL
Tel +44 (0)115 948 4711 Fax +44 (0)115 948 4185
www.arup.com

Scale at A4
1:50,000

Drawing Status
Issue

Job No	Drawing No	Issue
207894-00	Figure D6.1	P1

dFileLocation



Location of Designated Nature Conservation Areas provided by Natural England (http://www.gis.naturalengland.org.uk); Accessed October 2008

Legend

- Kirksanton Site
- Sites of Special Scientific Interest

Client: **RWE Npower Plc**

Job Title: **Kirksanton Site Nomination**

Drawing Title: **Nationally Designated Sites of Ecological Importance**

Issue	Date	By	Chkd	Appd
P1	31/12/08	IDR	IDR	

ARUP

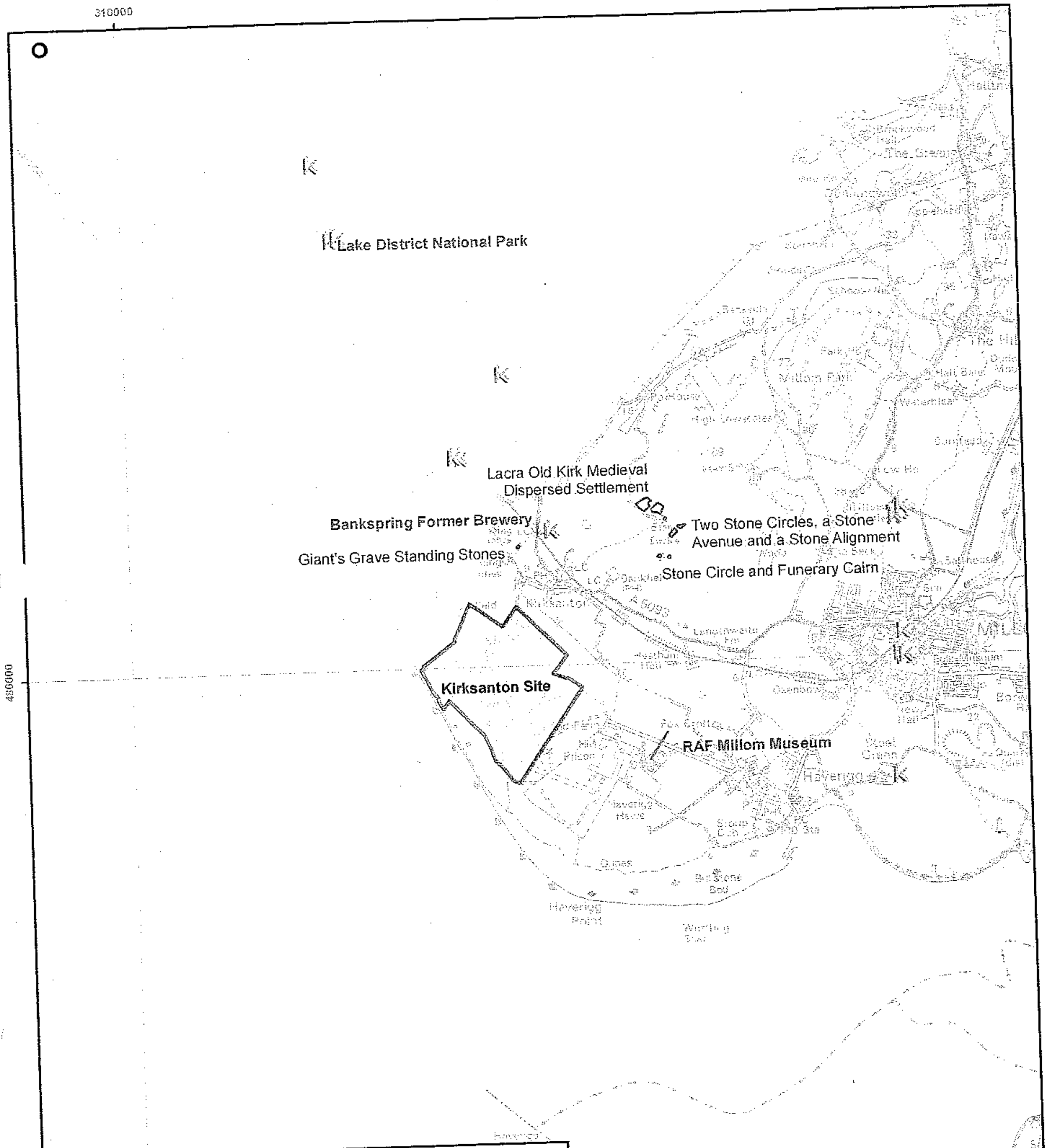
Arup Nottingham
3rd Floor The Frontage, Queen Street, Nottingham. NG1 2BL
Tel +44 (0)115 948 4711 Fax +44 (0)115 948 4185
www.arup.com

Scale at A4: **1:50,000**

Drawing Status: **Issue**

Job No	Drawing No	Issue
207894-00	Figure D7.1	P1

dFileLocation



Locations of Scheduled Ancient Monuments and Listed Buildings provided by English Heritage (http://www.english-heritage.org.uk/); Accessed

Legend

- Kirksanton Site
- Scheduled Monuments
- Lake District NP
- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

Client
RWE Npower Plc

Job Title
Kirksanton Site Nomination

Drawing Title
Areas of Amenity, Cultural Heritage and Landscape Value

Issue	Date	By	Chkd	Appd
P1	31/12/08	IDR	IDR	

ARUP

Arup Nottingham
3rd Floor The Frontage, Queen Street, Nottingham. NG1 2BL
Tel +44 (0)115 948 4711 Fax +44 (0)115 948 4185
www.arup.com

Scale at A4
1:50,000

Drawing Status
Issue

Job No	Drawing No	Issue
207894-00	Figure D8.1	P1

RWE

Dr. Leonhard Birnbaum
Mitglied des Vorstandes
Member of the Executive Board

Strategic Siting Assessment
Bay 128
Dept of Energy and Climate Change
1 Victoria Street
Westminster
LONDON SW1H 0ET
GREAT BRITAIN

Essen, April 9, 2009

RWE Npower plc nomination of land at Wylfa on Anglesey and Braystones and Kirkstanton in Cumbria into the Strategic Siting Assessment process.

Dear Sir / Madam,

On behalf of RWE AG, parent company of RWE Npower plc, I confirm that RWE AG fully supports RWE Npower plc's nomination of land at Wylfa on Anglesey and Braystones and Kirkstanton in Cumbria into the Strategic Siting Assessment process.

RWE AG is a major international energy company headquartered in Essen, Germany. Through its subsidiary, RWE Power, it has an extensive track record in commissioning, operating and decommissioning of nuclear power plants in Germany. It currently operates approximately 6.3 GW and generates 32 TWh of electricity per annum from its nuclear plants. It is also involved in decommissioning of four plants in Germany. RWE is significantly involved in the nuclear new build project at Belene, Bulgaria together with the Bulgarian State and is part of consortium involved in the nuclear new build activities in Cernavoda, Romania. This experience and expertise will be deployed to support RWE Npower plc's nuclear new build activities in the UK and will ensure that RWE Npower plc meets the UK Government's definition of a credible operator of nuclear power plant.

Yours faithfully

RWE Aktiengesellschaft
Opernplatz 1
45128 Essen
T +49 201 12-15000
F +49 201 12-15002
E leonhard.birnbaum@rwe.com

Annex D: Nomination Form

The purpose of this form

This nomination form is to put forward a site for consideration by the Secretary of State as strategically suitable for the deployment of a new nuclear power station by the end of 2025. The Strategic Siting Assessment evaluation will be at a strategic and high level and a list of approved sites will be included in the Nuclear National Policy Statement (NPS)

Along with this nomination form, there is an accompanying guidance note at Annex C of the Government response. This explains how to complete the form in more detail and sets out more fully the information required in connection with each criterion.

Copies of this nomination form in Microsoft Word format are available at http://www.berr.gov.uk/whatwedo/energy/sources/nuclear/consultations/closed-response/page47749.html

Which parts of the form need to be completed

Nominators should fill in as much of the nomination form as possible. The accompanying guide sets out the information we are seeking. However, for some information - for example possible mitigation actions - it is up to the nominator to determine what is appropriate and relevant.

If a nominator does not provide enough information, this may result in a request for further information. However, nominators should be aware that the failure to provide sufficient information may lead to the decision on the strategic suitability of the site for a new nuclear power station being subject to a number of conditions, or to the nomination being rejected completely.

Other documents that should be submitted with the form

In many cases, the nomination form makes clear what supporting documentation will be required. In other cases, it will depend on the details of the nomination (for example, the specific mitigation actions that may be required). Details of the supporting documentation being provided should be included in the table at the end of each question and in the overall list of supporting documents provided in Section F of the nomination form. Nominators should also include a document reference number (e.g. "001") for each separate supporting document they include and this reference should appear in the relevant tables and be clearly marked on the front of each supporting document itself.

How many copies of the completed form and supporting documentation should be provided?

Please submit the original and 3 copies of the nominated form and all other supporting material. **Please send all the required information to us in a sealed envelope or package marked "SSA Nomination Process" clearly on the front.**

Please also provide an electronic copy of the form and all supporting documents, preferably on an accompanying disc. We would prefer these documents as clean PDF files. Alternatively please supply Microsoft Word (2003 or earlier) files.

May nominations be submitted by email?

Because of the number of supporting documents required, paper-based nominations (with electronic files on an accompanying disc) are strongly preferred.

If nominators regard any information that they provide as commercially confidential and not for publication, they should make this clear on the relevant document or relevant part of the nomination form. They should also provide two versions of the documents provided electronically – one for publication (with the information removed or blacked out) and one not for publication.

What is the deadline?

Completed nomination forms and all associated documents should reach us by 5pm on Tuesday, 31 March 2009.

Where should completed nomination forms be sent?

The address for nominations is:

SSA Nominations
Bay 128
Department of Energy and Climate Change
1 Victoria Street
London
SW1H 0ET
ssanominations@decc.gsi.gov.uk

A Location and other qualifying information

A1 Please describe the location of the site

Title / name of site

Kirksanton

Description (in words)

Land at Kirksanton Haws, Cumbria. Grid Reference: SD134798

The Kirksanton site comprises approximately 131 hectares of land located north-west of Haverigg Wind Farm, south and west of the settlement of Kirksanton and southeast of Southfield.

The site boundary as shown in A2 relates only to onshore construction, and it should be noted that both a Marine Off-Loading Facility (MOLF) and inlet and outfall pipe-work will be required in coastal/marine areas, outside of the boundary shown on the plan. If, as explained in D10, the direct water cooling option is utilised it should be noted that pipe-work will extend to the open sea for up to 3km from potentially any seaward point shown on the boundary shown in A2.

This nomination is based on desk-based due diligence studies, a preliminary site investigation, and information drawn from the public domain. Detailed site investigations or surveys, or discussions with key stakeholders, statutory consultees or the local planning authority have not yet been conducted and do not inform the content of this nomination form or its supporting statements.

The form, scale, reactor type and configuration of supporting infrastructure of a nuclear power station at the Kirksanton site would be dependant on findings from detailed site surveys and studies, and site optimisation process.

A2 Please set out, by delineating on an Ordnance Survey map at 1:10,000 scale, the boundary of the site.

Documents provided in support of A2	**Your reference number** Please add a reference number to each document you provide
Annotated Ordnance Survey map at 1:10,000 scale showing boundary of the area	001

nominated	

A3 Is your nomination accompanied by a letter of support from a Credible Nuclear Power Operator (CNPO)?

Yes ☒ *If 'yes', then please include the letter from the CNPO with your completed form*

No ☐ *If 'no', then please include an explanation as to why it is credible that a new nuclear power station can developed at the site set out in A1 and A2 for deployment by the end of 2025.*

In addition, and given the importance of meeting carbon dioxide emissions targets, the Government would welcome information about sites that are capable of early deployment. The letter of support from the CNPO or the nominator's own statement should therefore also consider whether a new nuclear power station could be deployed on the site before 2025, the potential timescales for this early deployment, an estimate of the profile of early generation capacity that may be achievable on the nominated site and the reasons behind this statement.

Documents provided in support of A3	**Your reference number**
Letter from CNPO	002

A4 Have you taken steps to raise awareness of the nomination with local communities living in the vicinity of the site, including the owner(s) of the nominated sites?

Yes ☒ *If 'yes', then please provide, as a separate document, a statement of what you have done to meet this requirement. You should demonstrate that you have met the minimum requirement (making the RDA, relevant local authority and any land owners aware of the nomination and taking steps to publicise the nomination to the wider community through advertisements in local newspapers) together with any additional steps you have taken. Please confirm that you have made available information about how people can have their say to Government, as outlined in our guidance.*

No ☐ *If 'no', then the Government may not be able to consider your nomination further. However, you should explain why it has not been possible to meet the requirement and what you plan to do to remedy the deficiency and the timescales for doing so.*

Documents provided in support of A4	**Your reference number**

Statement on Local Community Engagement	003

A5 To help the Government ensure that that alternative sites for new nuclear build have been sufficiently considered at the strategic level, please set out (in a separate document if necessary) the process you followed for selecting this site for nomination, rather than any alternatives, together with the reasons that led you to make this selection:

Please refer to Supporting Document 004: Statement on Site Selection

Documents provided in support of A5	**Your reference number**
Statement on Site Selection	004

B Information about the person, company or other corporate body submitting the nomination

B1 **Please provide the full name and address and other contact details of the individual, company or other corporate body making this nomination**

Name of nominator

RWE Npower Plc

Trading/business name (if different from above and if appropriate)

n/a

Address

Windmill Hill Business Park,

Whitehill Way, Swindon Postcode SN5 6PB

Registered Office Address (if different from above and if appropriate)

As above

Postcode

Company registration number (if applicable)

3892782

B2 Holding Companies

Is the nominator a subsidiary of a holding company within the meaning of Section 736 of the Companies Act 1985?

No ☐ *If 'no', then please proceed to question B3*

Yes ☒ *If 'yes' then please complete the information below*

Name of ultimate holding company

99% Ownership by:

GBV Fünfte Gesellschaft für Beteiligungsverwaltung mbH

Address

RWE AG

Opernplatz 1, D-45128, Essen, Germany

Postcode

1% Ownership by:

RWE AG

Address

Opernplatz 1, D-45128, Essen, Germany

Postcode

Registered Office Address (if different)

n/a

Postcode

Company registration number

GBV Fünfte Gesellschaft für Beteiligungsverwaltung mbH: HRB16281

RWE AG: HRB14525

B3 Who can we contact about your application?

Please provide the details of someone whom we can contact directly with any questions about your application or information about its progress. The person you name should have the authority to act on behalf of the nominator and this information should be updated if either the contact or if the company pursuing the nomination change.

Name Mr Stuart Dagnall

Position	Nuclear Development Manager		
Address	RWE Npower Plc		
Windmill Hill Business Park, Whitehill Way			
Swindon, Wiltshire			
		Postcode	SN5 6PB
Telephone number (office)	01793 877777	(mobile)	
Fax number			
E-mail address	information@rwenpowercumbria.com		

C Information required about the SSA exclusionary criteria

C1 Demographic risk (exclusionary criterion)

Given the complexity of this calculation the Government has decided that it is not reasonable to expect nominators to carry out this calculation themselves; rather the calculations will be undertaken by the NII for the area of the nominated site.

Nominators therefore do not need to provide any further information, beyond the description of the site set out in A1 and A2 above, to support the assessment of this exclusionary criterion.

C2 Proximity to Military Activities (exclusionary criterion)

Given the security considerations around the information for this criterion, the Government has decided that it is not reasonable to require nominators to provide it themselves; rather the assessment will be undertaken by MoD for the area of the nominated site.

Nominators therefore do not need to provide any further information, beyond the description of the site set out in A1 and A2 above, to support the consideration of this exclusionary criterion.

Please note that proximity to other military activities is also covered in question D5 below as a Discretionary criterion.

D Information required about the SSA discretionary criteria

D1 Flooding (discretionary criterion)

Does the site (as set out in A1 and A2 above) fall within any areas of high flood risk – for example, within zone 3 of the Environment Agency flood risk categorisation?

No ☐ *If 'no', then please proceed to question D2.*

Yes ☒ *If 'yes' please explain which parts of the nominated site are affected in this way and the basis for this view.*

Description of any parts of the site that are affected by flooding risks as described above (if relevant). Please include a map, if appropriate.

Northernmost area of site includes areas designated as Flood Zone 3 and Flood Zone 2

Please refer to Supporting Document 005: Statement on Flood Risk

If you have answered 'yes' to D1 above, you should set out in a separate document which should be submitted with this nomination form why it is reasonable to conclude, at a strategic level, that a new nuclear power station within the nominated site could be protected against flood risk throughout its operational lifetime, including the potential effects of climate change, storm surge and tsunami. Please outline any countermeasures that you are assuming would need to be taken.

In addressing these points you should make sure that you have covered:

- the protection measures you believe would be appropriate to protect the site against flooding;
- whether the protection measures would affect other designated areas;
- the assumptions that have been made about off-site flood protection and water management and, in particular, the reliance on flood protection measures which are in the control of other parties, such as neighbouring landowners or government bodies;
- the potential for flooding to impede access to the site in respect of both normal operations and emergency services;
- whether the development of a new nuclear power station on the site (including any likely mitigation measures) is likely to increase flood risk elsewhere.

- Why it is reasonable to conclude that the nominated site is likely to pass the sequential test as set out in the guidance to nominators.

Documents provided in support of D1	Your reference number
Statement on Flood Risk	005

D2 Coastal erosion or other landscape change scenarios (discretionary criterion)

Does the site (as set out in A1 and A2 above) cover any areas that are at risk from coastal erosion or other landscape change scenarios?

No ☒ *If 'no', then please explain why you consider this to be the case and proceed to question D3.*

Explanation as to why the site will not be affected by the risks described above (if relevant). Please set out in a separate document, if necessary.

Please refer to Supporting Document 006: Statement on Coastal Erosion and Landscape Change

Yes ☐ *If 'yes', please explain which parts of the site are affected in this way and the basis for this view. You should also provide the further supporting information requested below.*

Description of any parts of the site that are affected by the risks described above (if relevant). Please include a map, if appropriate.

If you have answered 'yes' to D2 above, you should set out in a separate document, which should be submitted with this nomination form, why it is reasonable to conclude, at a strategic level, that a new nuclear power station within the nominated site could be protected against coastal erosion and other landscape change scenarios, including the potential effects of climate change, for the lifetime of the station. Please outline any countermeasures that you are assuming would need to be taken.

In addressing these points, or otherwise, you should make sure that you have covered the following:

- the wider impacts of any coastal protection countermeasures on areas surrounding the development of a new nuclear power station within the site;
- interaction with the local and regional plans for coastal protection and watercourse management; and
- any reliance on third party schemes for protection that is being assumed.

Documents provided in support of D2	Your reference number
Statement on Coastal Erosion and Landscape Change Scenarios	006

D3 Proximity to hazardous facilities (discretionary criterion)

Given the security considerations relating to the information for this criterion, the Government has decided that it is not reasonable to require nominators to provide this themselves. Rather the assessment will be undertaken by the Health and Safety Executive (HSE) for the area of the nominated site.

Nominators therefore do not need to provide any further information, beyond the description of the site set out in A1 and A2 above, to support the consideration of this discretionary criterion.

However, nominators may wish to put forward arguments in a separate document for countermeasures or mitigations, if they think that the nominated site may be affected.

We do not believe that the nomination site is at risk from any hazardous facilities and no information is therefore submitted on countermeasures or mitigations.

Documents provided in support of D3	Your reference number
No measures considered necessary	None

D4 Proximity to civil aircraft movements (discretionary criterion)

The Government recognises that not all the information for this criterion is available in the public domain and has therefore decided that it is not reasonable to require nominators to provide this themselves; rather the assessment will be undertaken by the Civil Aviation Authority (CAA) for the area proposed by the nominator.

Nominators therefore do not need to provide any further information, beyond the description of the site set out in A1 and A2 above, to support the consideration of this discretionary criterion. However, they are encouraged to check the proximity of civil aircraft movements to the nominated site (as set out in A1 and A2), where information is available in the public domain.

However, nominators may wish to put forward arguments in a separate document for countermeasures or mitigations, if they think that the nominated site may be affected.

Documents provided in support of D4	Your reference number
Statement on Proximity with Civil Aircraft Movements	007

D5 Proximity to other military activities (not covered by C2 above) (discretionary Criterion)

Does the site (as set out in A1 and A2 above) cover any areas that are in close proximity to or may affect MoD assets or activities not covered by criterion C2 above? Such assets and activities may include (but are not limited to) technical sites and transmitters, offshore danger areas, and nuclear facilities (including ports used by military vessels).

No ☒ *If 'no', then please explain why you consider this to be the case and proceed to question D6*

Explanation as to why the site will not be affected by the risks described above (in particular, identify any military activities in the vicinity of the site which were considered but dismissed as unlikely to be affected by the site's development). Please set out in a separate document, if necessary.

Please refer to support document 008: Statement on Proximity to Military Activities not Covered by C3

Yes ☐ *If 'yes', please explain which parts of the site are affected in this way and the basis for this view. You should also provide the further supporting information requested below.*

Description of any parts of the site that are in close proximity to or may affect MoD assets or activities not covered by question C2 above (if relevant). Please include a map, if appropriate.

If you have answered 'yes' to D5 above, you should set out in a separate document, why it is reasonable to conclude, at a strategic level, that this proximity should not rule out the site for consideration for a new nuclear power station. Nominators may wish to put forward arguments for countermeasures or mitigations, if they think that the nominated site may be affected

Documents provided in support of D5	Your reference number
Statement on Proximity to Military Activities not Covered by C3	008

D6 Internationally designated sites of ecological importance (discretionary criterion)

Is the nominated site (as set out in A1 and A2 above) in, or could its development impact, areas that are designated for ecological protection under the Ramsar and Natura 2000 networks?

No ☐ *If 'no', explain why you consider this to be the case and then please proceed to question D7.*

Explanation as to why the development of the nominated site will not have an impact upon any area in its vicinity, which is designated for ecological protection under the Ramsar and Natura 2000 networks.

Yes ☒ *If 'yes', please explain which areas are affected in this way and the basis for this view. You should also provide the further supporting information requested below.*

Identify the area(s) designated for ecological protection under the Ramsar and Natura 2000 networks that could be affected in this way (if relevant). Please include a map, if appropriate.

Duddon Estuary Ramsar Site, Duddon Estuary Special Protection Area and Morecambe Bay Special Area of Conservation

Please refer to Supporting Document 009: Statement on Internationally Designated Sites of Ecological Importance

If you have answered 'yes' to D6 above, you should set out in a separate document, which should be submitted with this nomination form, the likely level of impact and why it is reasonable to conclude, at

a strategic level, that it should be possible to avoid or mitigate any such impact to the standards set by the Habitats Directive.

Nominators are encouraged to share the results of any discussions they have had with statutory consultees and other nature conservation bodies responsible for overseeing the management of these areas in response to this criterion.

Documents provided in support of D6	Your reference number
Statement on Internationally Designated Sites of Ecological Importance	009

D7 Nationally designated sites of ecological importance (discretionary criterion)

Is the nominated site (as set out in A1 and A2 above) in, or could its development impact, any areas that are designated for ecological protection at a national level?

No ☐ *If 'no', explain why you consider this to be the case and then please proceed to question D8.*

Explanation as to why the development of the nominated site will not have an impact upon any area in its vicinity, which is designated for ecological protection at the national level.

Yes ☒ *If 'yes', please explain which areas are affected in this way and the basis for this view. You should also provide the further supporting information requested below.*

Identify the area(s) designated for ecological protection at national level that could be affected in this way (if relevant). Please include a map, if appropriate.

Duddon Estuary Site of Special Scientific Interest

Please refer to Supporting Document 010: Statement on Nationally Designated Sites of Ecological Significance

If you have answered 'yes' to D7 above, you should set out in a separate document, which should be submitted with this nomination form, the likely impact and why it is reasonable to conclude, at a strategic level, that it should be possible to avoid or mitigate any such impact.

Nominators are encouraged to share the results of any discussions they have had with statutory consultees and other nature conservation bodies responsible for overseeing the management of these areas in response to this criterion.

Documents provided in support of D7	**Your reference number**
Statement on Nationally Designated Sites of Ecological Significance	010

D8 Areas of amenity, cultural heritage and landscape value (discretionary criterion)

Is the nominated site (as set out in A1 and A2 above) in, or could its development have an impact upon, any area that is designated for its high amenity, landscape or cultural heritage value?

No ☐ *If 'no', explain why you consider this to be the case and then please proceed to question D9*

Explanation as to why the development of the site will not have an impact upon any area in its vicinity, which is designated for its high amenity, landscape or cultural heritage value. Please set out in a separate document, if necessary.

Yes ☒ *If 'yes', please explain which parts of the site are affected in this way and the basis for this view. You should also provide the further supporting information requested below.*

Identify the area(s) designated as being of high amenity, landscape or cultural heritage value, which could be affected in this way (if relevant). Please include a map, if appropriate.

Lake District National Park (Visual Impact)

Giant's Grave Standing Stone Scheduled Ancient Monument

Please refer to Supporting Document 011: Statement on Areas of Amenity, Cultural Heritage and Landscape Value

If you have answered 'yes' to D8 above, you should set out in a separate document, which should be submitted with this nomination form, the likely level of impact and why it is reasonable to conclude, at a strategic level, that it should be possible to avoid or mitigate any such impact.

Nominators are encouraged to share the results of any discussions they have had with statutory consultees and other nature conservation bodies responsible for overseeing the management of these areas in response to this criterion.

Documents provided in support of D8	Your reference number
Statement on Areas of Amenity, Cultural Heritage and Landscape Value	011

D9 Size of site to accommodate operations (discretionary criterion)

Please explain why it is reasonable to conclude that there is enough land within the boundary of the nominated site for the secure operation of at least one new nuclear power station.

In addressing this question, please also cover:

- provision for safe and secure storage of all the spent fuel and intermediate level waste produced through operation and from decommissioning on the site of the station, for several decades until it can be sent for disposal in a geological disposal facility; and
- whether there is adequate land available so that effective control over activities and access may be exercised on and around a new nuclear power station on the nominated site.

Documents provided in support of D9	Your reference number
Statement on Size of Site to Accommodate Operations	012

D10 Access to suitable sources of cooling (discretionary criterion)

Please provide information about the cooling technologies that are feasible for likely nuclear power station developments within the nominated site.

In addressing this question, please cover:

- whether it is reasonable to conclude that there are suitable sources of cooling for a new nuclear power station within the nominated site. (If water-based cooling is to be employed, the nominator should indicate why it believes that there is sufficient water for this purpose or other measures that need to be put in place);

- what impacts (including visual impact) there are likely to be from the need for cooling and why it is reasonable to conclude that these impacts are manageable or able to be mitigated;
- whether, at a strategic level and subject to local considerations, it is reasonable to conclude that a new nuclear power station on the nominated site would be able to be operated within normal environmental and regulatory requirements; and
- any issues that may affect cooling over the lifetime of the new nuclear station (including changes in meteorology, climate etc).

Documents provided in support of D10	**Your reference number**
Statement on Access to Suitable Sources of Cooling	013

E Declaration

I wish to nominate the site set out in A1 and A2 above for consideration by the Secretary of State as suitable or potentially suitable for the deployment of new nuclear power stations by the end of 2025.

I certify that the information in this nomination is correct to the best of my knowledge and belief.

Name of individual or, if making a nomination on behalf of a company or corporate entity, name of the Director of the Company, Company Secretary, Partner or otherwise duly authorised signatory

GUY JOHNSON, COMPANY SECRETARY

Signature of individual or, if making a nomination on behalf of a company or corporate entity, name of the Director of the Company, Company Secretary, Partner or otherwise duly authorised signatory

G. A. Johnson

If making a nomination on behalf of a company or corporate entity, please provide evidence that the individual signing this declaration is a Director of the Company, Company Secretary, Partner or otherwise duly authorised signatory.

Where the nomination is from more than one party, for example a consortium, all nominating parties should sign the declaration and provide evidence of their authority to sign (if appropriate).

Documents provided in support of the Declaration	Your reference number
Company Secretary Evidence	014

F List of all supporting documents provided with this nomination

Please list here, along with your reference numbers, all the supporting documents you are providing with this nomination. This list should include all the documents referred to in response to individual sections and questions above.

Documents provided in support of this nomination	Your reference number
Annotated Ordnance Survey map at 1:10,000 scale showing boundary of the area nominated	001
Letter from CNPO / Statement that the site is credible for deployment by 2025 (delete as appropriate)	002
Statement on Local Community Engagement	003
Statement on Site Selection	004
Statement on Flood Risk	005
Statement on Coastal Erosion and Landscape Change Scenarios	006
Statement on Proximity with Civil Aircraft Movements	007
Statement on Proximity to Military Activities not Covered by C3	008
Statement on Internationally Designated Sites of Ecological Importance	009
Statement on Nationally Designated Sites of Ecological Significance	010
Statement on Areas of Amenity, Cultural Heritage and Landscape Value	011
Statement on Size of Site to Accommodate Operations	012
Statement on Access to Suitable Sources of Cooling	013
Company Secretary Evidence	014

Kirksanton Site

A2: Supporting Document Reference 001: Site Location Plan
Please refer to Figure A2.1

A3: Supporting Document Reference 002: Letter from CNPO
Please refer to Appendix A, CNPO Letter

A4: Supporting Document Reference 003: Statement on Local Community Engagement
Please refer to Appendix B, Awareness Raising

A5: Supporting Document Reference 004: Statement on Site Selection

Any developer seeking to apply for planning permission for a new nuclear power station will, as required by the formal Environmental Impact Assessment (EIA) regulations, need to outline the main alternatives considered for that development. A criteria-based evaluation of sites suitable for commercial development of a nuclear power station has been undertaken, looking at previously developed and undeveloped sites across England and Wales. This study included consideration of technical criteria such as access to cooling water supply, grid, transport logistics, statutory designated sites and geotechnical suitability. Data was managed within a Geographical Information System to identify broad zones which were considered suitable to accommodate development and a refined sieving exercise was undertaken to develop a smaller number of potential sites, which have been further evaluated to inform the final selection of sites that will be proposed for inclusion within the Strategic Siting Assessment (SSA) process.

It is recognised that the Nuclear Decommissioning Authority (NDA) are also nominating a number of sites (the suitability of which has been confirmed by their own market testing exercise) and these are to be included within the NDA auction process, strengthening the number of alternative sites considered suitable for development. RWE npower considers that this process is robust and credible being in accordance with both criteria incorporated within the SSA and technical 'constructability' considerations as well as commercially acceptability.

In conformity to the SSA, this paragraph describes the process which we have embarked upon to make the nomination.

Within this nomination, we have provided all the information required by DECC and it is for DECC, based on this information, to determine, within this SSA process, whether the site meets the suitability for new nuclear power station development.

D1: Supporting Document Reference 005: Statement on Flood Risk

The Kirksanton Site, as described in Section A1, is situated in a coastal location, with its south-western boundary separated by a distance of between 130 and 250 m from the mean high water level of the Irish Sea. Between the Irish Sea and the nominated site lie a ridge of sand-dunes rising to 13 m AOD, while levels across the site vary between 6 and 16 m AOD.

There are no main rivers or watercourses within the majority of the site, although several engineered drainage ditches have been observed and the Wicham Brook (also variously referred to as the Kirksanton Pool and Haverigg Pool) which passes through the northern extents of the site in an engineered channel.

Fluvial Flood Risk

Environment Agency Flood Risk Maps, reproduced as Figure D1.1, show the Kirksanton Site as occupying land variously designated Flood Zone 1, Flood Zone 2 and Flood Zone 3, as defined by Table D.1 of Planning Policy Statement 25: Development and Flood Risk[1]. As such, while the majority of the site is described as having a less than 1 in 100 annual probability of flooding in any year, minor areas at the northern extent of the site are described as occupying Flood Zone 2[2] or Flood Zone 3[3] and are therefore subject to medium or high probability of river and sea flooding.

The expected source of flooding is not described although the indicated flood zones surround land adjacent to the watercourse variously named as the Wicham Brook, the Kirksanton Pool and the Haverigg Pool, which passes in an engineered channel approximately 150 m south of the Wicham Brook.

Environment Agency flood risk maps describe areas designated as Flood Zone 1, Flood Zone 2 and Flood Zone 3 as the flood risk areas as *"the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements"*[4], although clearly describe engineered flood defences on either side of the Wicham Brook as it passes closest to the Kirksanton Site.

Coastal Flood Risk

Recognising the limited publicly available Environment Agency flood risk mapping, site vulnerability to coastal flood risk has been considered with regards to the Safety Assessment Principles (SAP) for Nuclear Facilities[5]. Under the terms of the Safety Assessment Principles, the Nuclear Installations Inspectorate (NII) requires operators of sites licensed under the Nuclear Installations Act 1965 (as amended) to provide flood risk protection to withstand predicted sea level rises and other possible effects of global warming and extreme weather events such as a one in 10,000-year flood risk. On this basis, suitability of the Kirksanton site has been assessed based on the requirement that finished foundation levels for the site platform would require land at a level qualitatively calculated to be at least equal to this, with a

[1] DCLG, 2006. Planning Policy Statement 24: Development and Flood Risk, Department for Communities and Local Government, December 2006

[2] Flood Zone 2 is defined by PPS25 as land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding, or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding in a any year

[3] Flood Zone 3 is defined by PPS25 as land assessed as having a 1 in 100 or greater annual probability of river flooding, or between a 1 in 200 or greater annual probability of sea flooding in a any year

[4] Environment Agency Website; http://www.environment-agency.gov.uk/homeandleisure/37837.aspx, Accessed 27/02/2009

[5] HSE, 2006, Safety Assessment Principles for Nuclear Facilities 2006 Edition, Revision 1, Safety Assessment Principles: EHA.4 EHA.11, EHA.12, EHA.14, EHA.15, ECE.23

secondary level of protection provided by the provision of walls wave overtopping defence structures.

Extreme Tidal Levels

Extreme tide levels for the Kirksanton Site have been conservatively assumed equal to the levels referred in the Cumbria Shoreline Management Plan (SMP) for Duddon Barrow[6]. Based upon tidal levels described within the SMP, extreme tidal levels for return periods of 200 and 10,000 years have been interpolated from the regression shown in Figures D1.2 and D1.3.

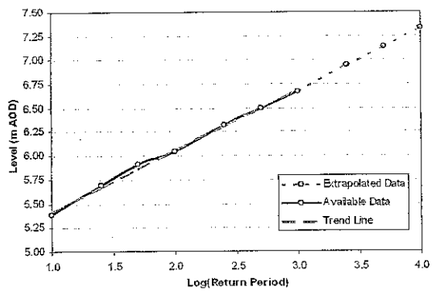


Figure D1.2: Logarithmic Regression of Extreme Tidal Levels from the SMP

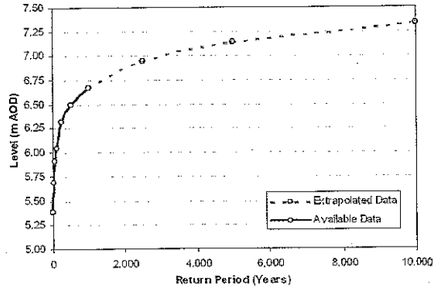


Figure D1.3: Interpolation & Extrapolation of Levels from the SMP

Based on the extrapolation of tidal levels described above, extreme tidal levels for 200 and 10,000 year events have been interpolated as 6.25 m and 7.33 m above Ordnance Datum (AOD) respectively. It is considered that through inclusion of the 1 in 10,000-year event, this extrapolation also allows for the effects of extreme storm surge events.

Climate Change Effects on Coastal Flood Risk

Climate change effects on coastal levels have been estimated in accordance with Table B.1 of PPS25[7]. At this strategic level, climate change effects have been estimated up to an arbitrary date of 2160, to allow for a 50 year operation and further 100 year decommissioning period from 2010. A sea level rise of 1.55 m is therefore predicted between publication of the SMP tidal data in 1998, and 2160.

Wave Protection

Based on wave height roses reported by the SMP[8], it is anticipated that wave protection defence of up to 4 m should be provided to any nuclear power station at the site. In this instance, it is expected that wave protection would be provided in the form of 1 m of freeboard, with another 3 m of wave protection providing secondary defence to the site.

Tsunami Risk

The risk of tsunami to the UK was assessed by the Department for Rural Agriculture and Rural Affairs (Defra) study on 'The threat posed by tsunami to the UK'[9]. The study afforded consideration to past events, possible tsunami source regions and conducted modelling of

[6] St Bees Head to Earnse Point Shoreline Management Plan, Map 6: Residual Tidal Currents, Bullen Consultants, January 1998

[7] DCLG, 2006. Planning Policy Statement 24: Development and Flood Risk, Department for Communities and Local Government, December 2006

[8] St Bees Head to Earnse Point Shoreline Management Plan, Map 5: Nearshore Wave Conditions, Bullen Consultants, January 1998

[9] Defra Flood Management, 2005. The threat posed by tsunami to the UK, June 2005.

propagation of tsunami waves from selected source locations. Findings of the study suggest that wave heights produced at the coast by tsunami-type events are unlikely to exceed those anticipated for major storm surges. Furthermore, consideration of four tsunami propagation events, suggested that the maximum heights of waves reaching the UK would not exceed 2 m, and would therefore be accommodated within the allowance provided for wave protection described above.

Consequently, it is appropriate at this stage to consider that possible effects for tsunami events would be accommodated within the 1 in 10,000 year tidal effects considered above and need not be afforded further specific consideration.

Coastal Flood Risk Vulnerability

Combining the extreme tidal levels with the potential climate change effects on sea levels forecast above, it is expected that to ensure resilience to coastal flood risk, a minimum foundation level for the site in excess of 8.8 m AOD would be required. Additional protection to 11.8 m AOD would be further required in order to prevent further wave overtopping. This is shown on the following Figure D1.4.

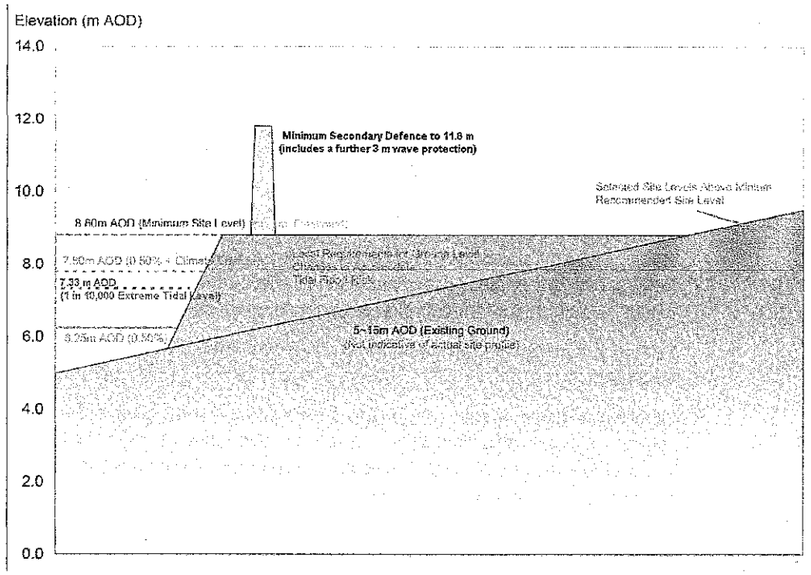


Figure D1.4: Schematic Representation of Site Elevations and Tidal Flood Risk Levels

According to Ordnance Survey topographic information[10], current ground level at the site varies from between 6 and 16 m AOD. Based on minimum site elevations required to accommodate tidal flood risk described above, it is 100 hectares of the total nominated 131 hectare site, is currently located at elevations in excess of 8.8 m AOD.

[10] Ordnance Survey NextMap Data

Flood Risk from Surface Water Management

Flood risk from surface waters would ultimately be dependant on the detailed design of surface water management measures adopted to accompany development at the Kirksanton Site. To ensure adherence to the requirements of both PPS25[11] and the SAP[12] safety case, it is expected that surface water management infrastructure would be required to be designed to accommodate surface water flood risk up to the 1 in 100 years return period, while also providing further allowance for the effects of climate change. Surface water management would further be expected to accommodate a worst case scenario of 'total lockdown' with no outfall possible.

As a consequence, surface water management infrastructure would be required to accommodate temporary storage of significant volumes of surface water. As detailed layout has not yet been determined for the site it is not yet possible to derive a surface water drainage strategy to manage surface water flow. However, surface water management would be designed to accommodate attenuation and storage for events described above, and look to employ a range of contemporary surface water management and sustainable drainage (SUDS) approaches, including swales and other detention measures, to ensure detention of surface waters.

Site Access

Access to the site would be determined through the process of plant layout and detailed design. Nevertheless, it is recognised that plant safety requirements may require normal operational and emergency access to be maintained in flood events. Given such a requirement, access to the site would be designed in order to be both resistant to flood events and also to prevent flood risk to off-site areas.

Measures to Protect Against Flooding

Dependant on detailed flood risk modelling and land use requirements of any proposed nuclear power station, a number of options exist to allow flood risk mitigation at the Kirksanton site that would be explored in combination with detailed design evolution.

Primarily, avoidance of areas of flood risk would ensure minimisation of flood risk to sensitive land use.

Where avoidance of areas subject to flood risk were not possible, flood risk management would rely on broad opportunities offered through either siting of non-sensitive land uses on flood vulnerable sites and through provision of flood risk mitigation works, in the form of elevated levels and flood protection barriers.

Mitigation would be required to comply with requirements of PPS25, primarily ensuring that local flood risk defences and mitigation works at the Kirksanton site, would not result in elevated flood risk off-site (upstream or downstream) of the site.

In all cases, it is expected that flood risk mitigation would be agreed to the satisfaction of the Environment Agency and other statutory regulatory bodies.

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[11] DCLG, 2006. Planning Policy Statement 25: Development and Flood Risk, Department for Communities and Local Government, December 2006

[12] HSE, 2006, Safety Assessment Principles for Nuclear Facilities 2006 Edition, Revision 1, Safety Assessment Principles: EHA.4 EHA.11, EHA.12, EHA.14, EHA.15, ECE.23

PPS25's Sequential Test

PPS25's sequential test[13] aims to steer new development to areas at the lowest probability of flooding, namely Flood Zone 1 (defined by PPS25 Table D.1 as having low probability of flooding). It does this through categorising development according to its vulnerability to effects of flood events, and providing a matrix approach to describe for levels of vulnerability, the appropriately compatible Flood Zone. For certain situations, PPS25 requires an exception test to be met to prove the case for development of certain land-use vulnerabilities within particular flood zones.

As discussed above, the majority of the Kirksanton Site lies occupies an area designated as Flood Zone 1 (low probability) with approximately 3.2 ha designated as within Flood Zone 2 (medium probability) and less that 1.5 ha occupying land designated as Flood Zone 3 (high probability). In this circumstance, while Table D.2 of PPS 25 would classify 'energy generating power stations' as 'essential infrastructure', consideration of proposals for the site as 'highly vulnerable', would allow a conservative approach to the sequential test. Table D.3 of PPS25 thus suggests that development should not be permitted within Flood Zone 3, while development within Flood Zone 2 would be subject to PPS25's exception test. As described above, only a minor proportion of the Kirksanton Site would therefore be expected to be unsuitable for development according to current Environment Agency flood risk plans.

It is expected that land, deemed to be unsuitable according to PPS25, would primarily be avoided. Were it considered necessary to develop land either currently designated as occupying Flood Zone 2 or Flood Zone 3, either as currently described or as a result of future flood risk vulnerability modelling, then development would be accompanied with complementary measures which would contribute to affecting an overall change in the functional flood plain.

Off-Site Effects

Detailed design would be required to demonstrate that development includes appropriate water management infrastructure such that surface water run-off and other discharged waters would not adversely affect flood risk or water quality downstream of the site. The off-site effect of discharge of surface and other waters would be included within flood risk assessment and contribute to determining the requirements and design of flood risk mitigation approaches described above.

In accordance with Regulation 48(1) of the Habitats Regulations 1994 (meeting the requirements of Article 6(3) of the Habitats Directive), projects that are likely to have a significant effect on a European Site require a process of 'Appropriate Assessment' to be undertaken. Such an assessment would consider the implications of development proposals in view of the conservation objectives of relevant designated sites with the aim of identifying whether an adverse effect on a designated site would occur. Given the presence of land variously designated under the Ramsar, Special Area of Conservation and Special Protection Area networks in the immediate vicinity of the Kirksanton Site, development of the site, including the need for flood defences, may therefore require that appropriate assessment be conducted to demonstrate that flood risk mitigation would not result in significant adverse effects to internationally designated areas immediate south-western site boundary.

[13] PPS25, Annex D

Ensuring the performance of flood mitigation measures would be achieved through the use of proprietary flood risk management approaches, designed such that discharged waters would not adversely affect designated areas, in terms of water quality or hydrological flow regimes.

D2: Supporting Document Reference 006: Statement on Coastal Erosion and Landscape Change Scenarios

The Kirksanton Site, as described in Section A1, occupies a coastal location, with its south-western edge approximately fronting onto the coastal margins of the Irish Sea to the north of the Duddon Estuary. Between the nominated site boundary and the sea lies the coastline formed from sand and mudflats subject to tidal inundation, a shingle beach, and sand dune progression and dune heath and grasslands.

Coastal Processes and Geomorphology

The Kirksanton Site is included within a broader stretch of coastline extending between Haverigg Point to the south, and Silecroft, which is characterised by dune systems of the Haverigg Dunes and Kirksanton Haws. The dunes are fronted on a shingle veneer beach and a lower sandy foreshore, which progressively widens from north to south, as the mouth of the Duddon Estuary is approached. The dune system is considered to be formed by sand blown from the outer Duddon sand-bars accumulating on the coastal shingle and scars and exhibits typical sand dune behaviour, with a progressive development of growth and stability as one moves inland.

Coastal Defences

The Kirksanton Site, like the rest of the coastline between Haverigg and Silecroft, is subject to man-made defences. The site is naturally defended by the sandy beach which leads inland, via a natural shingle bank, to a system of dunes at Kirksanton Haws.

Coastline Movement

Historically, the actual observed rate of change along the coast has been low. Comparison of historic maps dating back to the 1850s provides no observable movement[14]. In terms of typical coastline movement, the section of coastline that includes the Kirksanton Site is described as on the boundary of areas experiencing erosion at a typical rate in the order of 0.5 m/year, and accression at a typical rate of 0.3 m/year[15]. Coastal processes described by The Cumbria Shoreline Management Plan (SMP)[16] reinforce this, predicting that the coastline would continue to erode at a rate similar to that observed at present. Long-term behaviour is however considered less predictable, given the possibility that blown sand from the outer Duddon sand bars, which currently feeds the dune system, may become exhausted and without a source of sand input, the coast may become more susceptible to coastal processes.

Predictions of Coastline Change

The North West England and North Wales Coastal Group are currently preparing a revised Shoreline Management Plan (SMP) for the coast between Great Orme's Head and the Scottish Border, taking in the coastline potentially affecting the Kirksanton Site.

In line with 2006 Defra Guidance, the revised Shoreline Management Plan provides assessments of existing defences and the residual life of defences along the shoreline in the event of no active intervention and with continued present management. Assessments of shoreline stability take into account UK Climate Impacts Programme (UKCIP) projections for

[14] Landmark Information Group Service, Envirocheck report for National Grid Reference 313460, 479870, 28-Oct-2008

[15] Copeland Borough Council, 1998. St Bees Head to Earnse Point, Isle of Walney Shoreline Management Plan; Map 3: Typical Rates of Coastline Movement, Jan 1998

[16] Copeland Borough Council, 1998. St Bees Head to Earnse Point, Isle of Walney Shoreline Management Plan, Map 6: Residual Tidal Currents, Bullen Consultants, January 1998

The following predictions for coastal trends are based on the Shoreline Management Plan Baseline Process Understanding for Haverigg Dunes, which incorporates the dune system of Kirkstanton Haws that lies between the site and the coast[17].

Years 0 to 20
In the absence of any formal or informal defensive works, the coastal dune system is expected to remain relatively stable with episodic erosion during storm events.

Yeas 20 to 50
It is predicted that in years 20 to 50, the dune system will also remain stable despite sea level rise, with blowout development and shoreline recession during storm events. It is postulated that increasing tidal levels may increase the frequency at which storm events may reach the dune system, although this is considered something which could be managed through extending defensive systems.

Years 50-100
In years 50-100, the dune system as a whole is expected to remain resilient to sea level change. It is further predicted that sediment from adjacent coastlines may also contribute to sustaining the dune system.

[17] North West England and North Wales Shoreline Management Plan, Appendix C: Baseline Process Understanding, Part Q: Hodbarrow Point to St Bees Head (including Rivers Calder and Ehen), Section 4: Baseline Scenario Assessments, Revision 05/12/2008

D4: Supporting Document Reference 007: Statement on Proximity with Civil Aircraft Movements

It is noted that additional information is not required to be supplied in response to this criterion. However, the following information regarding the proximity of civil aircraft movements is provided to support the assertion that civil aircraft movements would not be a significant risk.

Having investigated publicly available information it is believed that within 30 km of the nominated site, specified in Section A1, there exists three airfields/aerodromes. These include the following:

- Millom Airfield: Adjacent to the site, although now disused and occupied by the Haverigg III wind farm;
- Cark Airfield: An unlicensed airfield over 20 km east of the site; and,
- Barrow / Walney Island Airfield: A licensed airfield located approximately 9 km south of the Kirksanton Site.

Of the three, two are unlicensed and as such limited information is publically available. These are as follows;

Public Safety Zones

The Copeland Local Plan Proposals Map does not designate any areas of the site as Public Safety Zones. No further evidence of Public Safety Zones affecting the Kirksanton site has been obtained.

Aerodrome Safeguarding Plans

Annex 4 to DfT Circular: 1/2003 describes those aerodromes which are officially safeguarded and for which official safeguarding maps have been issued. The closest officially safeguarded aerodromes to the Kirksanton site are Blackpool Airport and Carlisle International Airport. Both Blackpool and Carlisle Airports lie in excess of 60 km from the site, and therefore beyond the 13 km radius that the Civil Aviation Authority recommends should be considered[18].

Aerodrome Traffic Zone (ATZ)

The closest Aerodrome Traffic Zone (ATZ) is that of Barrow / Walney Island Aerodrome, which has a circle radius of 2 nautical miles (approximately 3.5 km)[19]. This remains over 5 km from the site.

[18] Civil Aviation Authority, 2006. CAP 738: Safeguarding of Aerodromes, Appendix A, paragraph 2

[19] http://www.nats-uk.ead-it.com/public/index.php%3Foption=com_content&task=blogcategory&id=16&Itemid=71.html: Accessed 16/2/09

D5: Supporting Document Reference 008: Statement on Proximity to military activities not covered by C3

Ordnance Survey mapping[20] indicates the Eskmeals Danger Area, offshore from Ravenglass, approximately 12 km north-west of the site. Analysis of 1:25,000 Ordnance Survey mapping shows no evidence for the presence of MoD facilities within 10 km of the Kirksanton Site. It is considered that development at the Kirksanton Site would not affect activities at Esksmeals.

[20] Ordnance Survey 1:25,000 Explorer Map, Sheet OL6, '*The English Lakes: South-western Area*', *2002*

D6: Supporting Document Reference 009: Statement on Internationally Designated Sites of Ecological Significance

As shown in Figure D6.1, the south-western boundary of the Kirksanton Site, as described in Section A1, lies in the immediate vicinity of the northern boundary to the Duddon Estuary. The Duddon Estuary is variously afforded international nature designations under the Ramsar network, the Special Protection Area (SPA) network and the Special Area of Conservation (SAC) network.

Given the nature of the internationally designated areas in the vicinity of the site, construction and operation of a nuclear power station may have the potential to result in a range of potential effects on the ecological status of surrounding areas. Nevertheless, the site's location, at the north-west extent of all designated areas and further extending beyond the limits of any designated sites, offers specific opportunity for avoidance and mitigation of impacts.

Opportunities for avoidance, mitigation and enhancement therefore comprise of the following:

- The site avoids direct effects on all ecologically designated sites and development would not necessarily entail loss of any internationally designated areas;
- The south-western site boundary extends beyond the limits of the Duddon Estuary SSSI boundary. Marine access to the site can be achieved without the need to pass through designated areas;
- The Duddon Estuary SSSI, in the vicinity of the site, does not include coastal waters beyond the low water level;
- The location provides further opportunity to utilise the only band of land lying between the extremity of internationally designated ecological sites and the Lake District National Park;
- Development with due regards to findings of comprehensive ecological surveys, would allow a site configuration to be developed to avoid particularly sensitive areas and provide protection to species in the designated areas from visual and light effects and noise and dust emissions during construction.

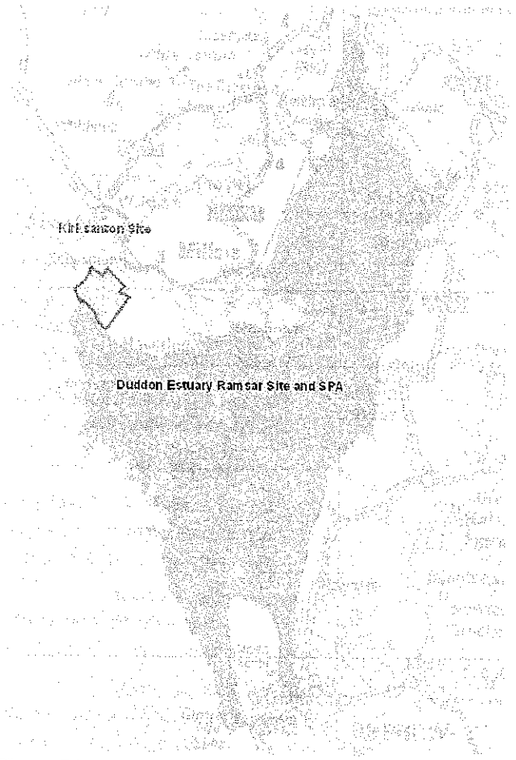


Figure D6.2: Location of the Kirksanton Site with regards to the Duddon Estuary Ramsar Site and Special Protection Area

Duddon Estuary Ramsar Site

The south-western edge of the Kirksanton Site lies in the immediate vicinity of the northern boundary of the Duddon Estuary, which is named as a Wetland of International Importance under the Convention on Wetlands of International Importance, especially as Waterfowl Habitat (the Ramsar Convention). Information on the Duddon Estuary Ramsar Site is drawn largely from the Ramsar Information Sheet for the site[21].

Location and Character

The Duddon Estuary Ramsar Site occupies much of the estuary at the mouth of the River Duddon and its confluence with the Irish Sea. In relation to the Kirksanton Site, the Duddon Estuary Ramsar Site is shown to occupy a portion of the land immediately between the south-west boundary of the site, taking the dune system at Kirksanton Haws, and the shingle beach and extends approximately 10 km south and 10 km inland of the site.

Notable habitats are sand and mudflats, saltmarsh and particularly sand-dune communities such as those between the Kirksanton site and the beach. The Ramsar Information Sheet further describes the character of the overall site as "*the most important in Cumbria for sand-dune communities including large areas of calcareous dunes at Sandscale and Haverigg Haws and contrasting acid dunes on North Walney*".

Qualifying Features

The Duddon Estuary Ramsar site is considered important in terms of the Ramsar Convention owing to its presence of wetland species, including natterjack toads and its role in migratory and wintering populations and important species of water birds. The site is designated as a Ramsar Site as it satisfies the following four qualifying criteria:

- Ramsar Criterion 2: The site supports important numbers of natterjack toad *Epidalea calamita* (formerly *Bufo calamita*). In addition, it further supports a rich assemblage of wetland plants and invertebrates;
- Ramsar Criterion 4: The site supports nationally important numbers of waterfowl during spring and autumn passage;
- Ramsar Criterion 5: The site supports assemblages of international importance; and,
- Ramsar Criterion 6: The site hosts species and populations occurring at levels of international importance. In particular, wintering populations of Northern pintail, *Anas acuta*, Red knot, *Calidris canutus islandica*, and Common redshank, *Tringa totanus tetanus.*

Conservation Threats

Section 26 of the Ramsar Information Sheet reports no factors adversely affecting the site's ecological character, and that the site is not described as subject to adverse ecological change.

Duddon Estuary SPA

The Kirksanton Site is shown located in the immediate vicinity of the north-west extent of the Duddon Estuary Special Protection Area (SPA) which occupies a similar designated area to the Duddon Estuary Ramsar Site. Details of the Duddon Estuary Special Protection Area are published on the Joint Nature Conservation Committee's (JNCC) web-based 'site account'[22].

[21] Ramsar Information Sheet IK11022: Duddon Estuary, Produced by JNCC: Version 3.0, 13/06/2008

[22] http://www.jncc.gov.uk/default.aspx?page=1981; Accessed 13/02/09

Location and Character

The Duddon Estuary is located north-west of Morecambe Bay on the coast of Cumbria in north-west England. The Duddon Estuary SPA occupies an area similar to that of the Duddon Estuary Ramsar Site. At its closest, it takes in the Kirksanton dunes and a portion of the beach lying between the site and the Irish Sea, while it extends 10 km south and east of the site.

The site account further describes the site as "*mostly consisting of intertidal sand and mud-flats, important for large numbers of wintering and passage waterbirds*". It further reiterates that the site is the most important in Cumbria for sand-dune communities citing again those at Haverigg Haws and contrasting acid dunes on North Walney. There are a number of settlements and industrial areas on the periphery of the site. Artificial habitats include slag banks and a flooded iron-ore working known as Hodbarrow Lagoon forms the largest coastal lagoon in north-west England. The intertidal sand and silt-flats contain abundant invertebrates that support important numbers of wintering waterbirds, especially waders, during the migration and winter periods. Saltmarshes, sand dunes and Hodbarrow Lagoon act as important high-tide roosts for wintering waders and wildfowl. High-tide roosts are also found outside the site boundary on the landward side. The site is also of importance for breeding terns which nest in dune areas and slag banks, and feed in the shallow waters of the estuary and surrounding waters. Hodbarrow Lagoon is a key high-tide roosting site for terns.

Qualifying Features

The Duddon Estuary qualifies for designation as a Special Protection Area under Article 4.1 of the 'Birds Directive' (Council Directive 79/409/EEC on the Conservation of Wild Birds) owing to role in supporting populations of various bird species of European importance.

The Sandwich Tern Sterna *sandvicensis*, is identified as an Annex I species (which under the terms of the Birds Directive requires it to be subject of special conservation measures concerning their habitat) with a reported 210 pairs representing at least 1.5% of the breeding population in Great Britain (5 year mean, 1988-1992).

The site also qualifies by supporting populations of European importance of the migratory Annex II species as follows:

- Ringed Plover *Charadrius hiaticula*;
- Sanderling *Calidris alba*;
- Knot *Calidris canutus*;
- Pintail *Anas acuta*; and,
- Redshank *Tringa tetanus*.

The area also qualifies under Article 4.2 of the Directive by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 78,415 individual waterfowl including: Curlew *Numenius arquata*, Dunlin *Calidris alpina alpina*, Sanderling *Calidris alba*, Oystercatcher *Haematopus ostralegus*, Red-breasted Merganser *Mergus serrator*, Shelduck *Tadorna tadorna*, Redshank *Tringa totanus*, Knot *Calidris canutus*, Pintail *Anas acuta*.

Morecambe Bay SAC

Details of the Morecambe Bay Special Area of Conservation (SAC) are published on the Joint Nature Conservation Committee's (JNCC) web-based 'site account'[23] and further detailed in the Morecombe Bay Natura 2000 Data Form[24].

Location and Character

The Kirksanton Site borders the northern-most extent of Morecambe Bay, which itself occupies an area in the order of 61,500 ha taking in the confluence of four principal estuaries, collectively forming the largest single area of continuous intertidal mudflats and sandflats in the UK.

In the vicinity of the Kirksanton Site, Morecambe Bay SAC occupies a similar area to the Duddon Estuary Ramsar Site and SPA, and takes in portion of land between the site and the Irish Sea. However the SAC extends beyond the footprint of the Duddon Estuary Ramsar Site and SPA, with the majority of the designated site extending up to 35 km south and east of the site.

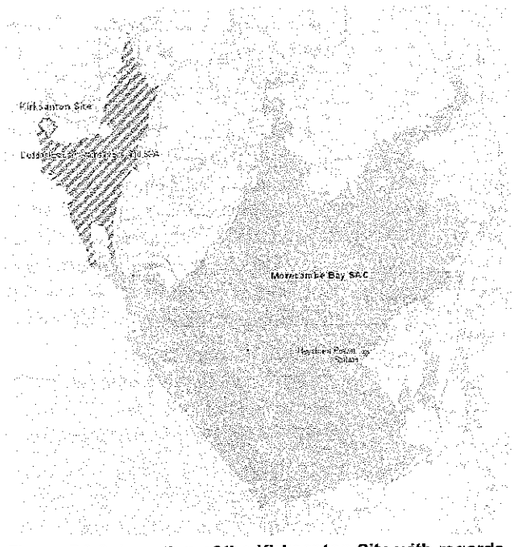


Figure D6.3: Location of the Kirksanton Site with regards to the Morecambe Bay Special Area of Conservation

The Natura 2000 Data Form for Morecambe Bay further describes characteristics as follows:

> *"The estuaries support dense invertebrate communities, their composition reflecting the salinity and sediment regimes within each estuary. Extensive saltmarshes and glasswort Salicornia spp. beds are present in the Lune estuary, contrasting with the fringing saltmarshes and more open intertidal flats of the Leven and Kent estuaries. Most of the saltmarshes are grazed, a characteristic feature of north-west England. In the upper levels of the saltmarshes there are still important transitions from saltmarsh to freshwater and grassland vegetation. Water quality is generally good."*

Qualifying Features

Features and characteristics of the Morecambe Bay SAC of particular quality and importance are described in Section 4.2 of the Natura 2000 Data Form. In summary, Morecambe Bay is considered by the JNCC to be one of the best areas in the United Kingdom for the following habitats and species:

- Estuaries;

[23] http://www.jncc.gov.uk/default.aspx?page=1981; Accessed 13/02/09

[24] Natural 2000 Standard Data Form for Speacial Protection Areas (SPA), for Sites Eligible for Identification as Sites of Community Importance (SCI) and for Special Areas of Conservation (SAC), Site Code UK0013027, Compilation Date 199610, Update 200305

- Mudflats and sandflats not covered by seawater at low tide;
- Large shallow inlets and bays;
- Perennial vegetation of stony banks;
- Salicornia[25] and other annuals colonising mud and sand;
- Atlantic salt meadows;
- Humid dune slacks;
- Shifting dunes along the shoreline with Ammophila arenaria ('white dunes');
- Fixed dunes with herbaceous vegetation ('grey dunes'); and,
- Great Crested Newt (*Triturus cristatus*).

Morecambe Bay is further considered to support a significant presence of the following:

- Sandbanks which are slightly covered by sea water all the time;
- Coastal lagoons;
- Reefs;
- Embryonic shifting dunes;
- Atlantic decalcified fixed dunes (Calluno-Ulicetea); and,
- Dunes with Salix *repens ssp. argentea* (*Salicion arenariae*);

Of the species and habitats described above, the Kirksanton Site is observed to be particular influenced by mudflats and sandflats not covered by seawater at low tide and dune systems

Threats

The JNCC Natura 2000 Data Form for the Morecambe Bay SAC[26] describes how despite the wide range of pressures on Morecambe Bay, the site is relatively robust and many of these pressures have only 'slight or local effects' on its interests.

The interests depend largely upon the coastal processes operating within the Bay, which have been affected historically by human activities including coastal protection and flood defence works. The saltmarsh is traditionally grazed and is generally in favourable condition for its bird interest. Most of the saltmarsh is traditionally grazed and is utilised by breeding, wintering and migrating birds for feeding, roosting and nesting purposes.

Specific Vulnerabilities

Given the nature of the international designations existing to the southeast of the Kirksanton Site, construction and operation of the site for a nuclear power station has the potential to result in a range of potential effects to the Duddon Estuary Ramsar Site and Special Protection Area, and the Morecambe Bay Special Area of Conservation. Effects would require comprehensive assessment during Environmental Impact Assessment which would be required in advance of consent and development of the site.

[25] A species of halophyte (salt tolerant) plants that grow in salt marshes

[26] Morecombe Bay Natura 2000 Data Form, JNCC, Version 2.1, 17/05/06

Effects that may be expected upon the integrity of the designated area described above include the following:

Vulnerability of the Marine Environment
Possible physical effects on the marine environment may be caused by physical changes to the sea bed during construction associated with a Marine Off-Loading Facility (MOLF), cooling water inlet and outlet infrastructure and through dredging required to maintain marine access.

Operation of the cooling water system could affect the surrounding area in three ways, the release of warm water into receiving waters, the release of biocide into receiving waters, and the impingement and entrainment of free swimming organisms in water entering the cooling water system. Possible effects of the cooling water system are discussed further in Section D10.

Construction and operation of a Marine Off-Loading Facility, to allow large plant items to access to the site from marine vessels via the beach, may result in a degree of disturbance both to beach materials, benthic flora and fauna, and to over-wintering and migrating bird species.

Further physical effects may be experienced by the sea-bed where dredging were required to allow marine vessels to access the MOLF and where dredging were to be disposed of at sea.

Vulnerabilities of Terrestrial Species and Habitats
Development of the nominated site for a new nuclear power station would result in a degree of disturbance to terrestrial habitats at the site. At this strategic state, detailed ecological desk-study or field survey of the site have yet to be completed, although designations for the Duddon Estuary refer to the suitability of habitat for a number of species. Great Crested Newt (*Triturus cristatus*) and Natterjack Toad *Epidalea calamita* (formerly *Bufo calamita*), both of which are protected under schedule 5 of the Wildlife and Countryside Act 1981, are both identified as associated with the designated areas.

Development of the Kirksanton site would also result in development and loss of habitats directly below the developed site footprint. Large areas of calcareous dunes are found at Haverigg Haws, with shifting and fixed dune types both identified in Annex I of the Habitats Directive[27], primary among the habitats identified in affording international designations to the Duddon Estuary.

Birdlife Vulnerability
Birds that use mud and sandflats for feeding and roosting are vulnerable to disturbance from human activities. Disturbance can lead to reduced time spent feeding, or individuals being restricted to areas with a poor food supply. Construction and operation of a nuclear power station may result in local increases in noise and in light emanating from the site and may therefore have the potential to cause some disturbance to migrating and overwintering birdlife using exposed sand flats at low-tide, for feeding.

The Kirksanton Site occupies land currently used as agricultural land. While land immediately to the south-west of the site includes sand dune progressions and the shingle beach, these have been excluded from the boundary of the nomination and will not be directly affected.

[27] Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, transposed into UK national law by means of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended)

Hydrological Vulnerability
Construction and operation of a new nuclear power station on the nominated site would have the potential to affect hydrological and hydrogeological conditions of the site.

Development of the site would result in a change in a proportion of the current agricultural ground surface to that of an engineered load-bearing surface. This would consequently result in a change the surface water characteristics, particularly with regards to the surface water flow regime and infiltration. During construction, the requirement for earthworks, reprofiling and civil engineering activities at the site would result in possible production of large quantities of dust and sediment run-off that would require management prior to discharge. Construction may also result in possible leaks of polluting materials which would also require interception and management.

In the long-term, engineered surfaces would be expected to result in a reduction of current levels of water infiltration and increased quantities and velocities of surface water run-off.

Impact Avoidance, Mitigation and Enhancement
Impacts to the Duddon Estuary would primarily be avoided through not allowing physical activities to incur within designated areas. The Kirksanton Site is located at the extreme north-west of the Duddon Estuary's designated site and extends beyond any designated areas. Incursion into areas afforded international ecological designations would not be necessary in order to develop the site.

Prior to detailed design and development, comprehensive desk-study and field survey data should be collated, over a period of multiple seasons, in order to fully obtain the terrestrial habitats and species that the site supports. Based on an understanding of the Kirksanton Site's actual ecological values and functions, detailed design could be conducted with due regard to local ecological conditions, to design-out as far as possible, potential conflict with and impact to ecologically valuable habitats and species.

Further impact avoidance and mitigation would be ensured through development and implementation of a thorough construction and operational environmental management plans. During construction, employment of and adherence to a robust environmental management plan would ensure that potential effects of each aspect of development would be considered and overseen by qualified environmental managers. Appointment of an overseeing Ecological Clerk of Works would provide an ongoing watching brief with regards to potential ecological impacts of specific activities.

In the long-term, environmental management of the plant could look to maximise opportunities for compensation of lost habitat and enhancement of habitats with and surrounding the facility.

Mitigation of Effects on the Marine Environment
Marine offloading, and traffic between a Marine Off-Loading Facility (MOLF) and the site, should avoid areas designated as of international ecological interest, and also those specific areas identified as significant at a site-survey level. Notwithstanding, construction of a MOLF and supporting access would require appropriate attention to be afforded to ensuring that construction activities did not encroach upon surrounding areas. Aspects of the marine environment of particular value would be identified and demarcated to ensure that construction activities avoid these areas.

It is expected that the MOLF may be removed after its role in construction and commissioning the plant were to be completed. Nevertheless, given that the MOLF will be required for a construction period spanning several years, opportunities for integrating it with the current

marine environment could be explored. In particular, surface treatments, to encourage temporary colonisation of marine life, though placement of appropriate rip-rap materials, may be adopted.

Cooling water abstraction and discharge pipes should, where possible, avoid land designated as of international or other ecological importance. It is noted that the site is located at the extremity of the estuary, and that the limit of designation at the site is the mean low water level. As such, it is expected that cooling water discharge pipes could be located in order to allow sufficient dispersion of cooling water can be achieved without affecting the character of any designated areas.

Mitigation of Effects on Terrestrial Species and Habitats

Development of a nuclear power station at the Kirksanton Site would result in significant change to the nature of terrestrial habitats and species currently found at the site.

As described above, the current agricultural management of the site suggests that habitats are currently subject to active intervention. Nevertheless, where significant habit or species were to be encountered, a range of mitigation approaches may still be adopted.

Areas of valuable terrestrial habitat encountered within the site would be considered for in-situ conservation. Where safety or other site development constraints determine this to be inappropriate, ex-situ habitat compensation and enhancement of surrounding land parcels may be appropriate. Enhancement would also be considered to ensure continued connectivity of key habitat corridors and prevention of fragmentation. Translocation of species, followed by securing the site to prevent recolonisation prior to development would also ensure mitigation of impact to terrestrial species.

Timing of works would be programmed to avoid periods of specific vulnerability to species identified during site surveys.

Mitigation of Effects to Birdlife

Measures to mitigate possible impacts to birdlife have already be significantly influenced through avoidance of areas designated as of international and national ecological significance. The Kirksanton site boundary avoids direct impact to nearby internationally designated sites of value to birdlife.

Construction impacts to bird populations of the Duddon Estuary could further be mitigated by timing operations to minimise conflict between construction operations and times of the year when important bird concentrations are assembled. Screening of construction areas and operations would be essential to contain disturbance effects. Restriction of access by personnel away from the construction site would control the effects of direct human interference which visual and acoustic screening may also mitigate the effects of noise and visual interference to birds in neighbouring areas. Subsidiary lights can also be placed to detract birds from tall, high powered lights.

Development of the site would also introduce the opportunity for ecological enhancements in terms of exploring opportunities for landscaping and enhancing provision for conservation opportunities.

Mitigation of Hydrological Effects

Construction activities have the potential of resulting in production of quantities of sediment, polluting materials and also affecting the natural hydrological regime of the site, such that effects may affect the designated habitats of the Duddon Estuary. Environmental management

of the construction process would be required to control and prevent construction activities from resulting in deleterious effects on the Ramsar Site, SPA and SAC.

As a component of the detailed site design, permanent drainage infrastructure would be subject to approval of various regulatory agencies including the Environment Agency and Nuclear Industries Inspectorate. Surface waters would require management such that extreme flood events would not inundate the site, nor require discharge of untreated or polluted effluent streams.

In accordance with current regulatory requirements, potentially polluting liquids would require storage in appropriately bunded areas and management according to Environment Agency guidance.

Appropriate Assessment

Plans or projects that are likely to have a significant effect on a European Site also required 'Appropriate Assessment' to be undertaken in accordance with Regulation 48(1) of the Habitats Regulations 1994 (meeting the requirements of Article 6(3) of the Habitats Directive). Natural England, as statutory advisors to Government will also therefore be expected to advise on the need or otherwise for Appropriate Assessment of proposals for any nuclear power station at the site. Such an assessment would consider the implications of development proposals in view of the conservation objectives of relevant designated sites with the aim of identifying whether an adverse effect on a designated site would occur. Should this be the case, then the project would only be able to proceed if it could be demonstrated that no alternative solutions exist and that the project must be carried out for reasons of overriding public interest.

D7: Supporting Document Reference 010: Statement on Nationally Designated Sites of Ecological Significance

As described in Figure D7.1, the south-western boundary of the Kirksanton Site lies in the immediate vicinity of the northern boundary to the Duddon Estuary, which is afforded national nature designation as a Site of Special Scientific Interest (SSSI). The site further located in the order of 1 km south-east of the Shaw Meadon and Sea Pasture SSSI.

Given the nature of the internationally designated areas in the vicinity of the site, construction and operation of a nuclear power station may have the potential to result in a range of potential effects on the ecological status of surrounding areas. Nevertheless, the site's location, at the north-west extent of all designated areas and further extending beyond the limits of any designated sites, offers specific opportunity for avoidance and mitigation of impacts.

Opportunities for avoidance, mitigation and enhancement therefore comprise of the following:

- The site avoids directly affecting all nationally designated areas. Development would not directly result in loss of any nationally designated ecological areas;
- The south-western site boundary extends beyond the limits of the Duddon Estuary SSSI boundary. Marine access to the site can be achieved without the need to pass through designated areas;
- The Duddon Estuary SSSI, in the vicinity of the site, does not include coastal waters beyond the low water level;
- The location provides further opportunity to utilise the only band of land lying between the extremity of internationally designated ecological sites and the Lake District National Park;
- Development at the site could be undertaken with due regards to findings of comprehensive ecological surveys to allow site configuration to avoid particularly sensitive areas; programming to avoid sensitive seasonal constraints and mitigation to provide protection to species in the designated areas from visual and light effects and noise and dust emissions during construction.

Duddon Estuary SSSI

The ecological character and management requirements of the Duddon Estuary SSSI, are described below, based on information provided by Natural England.

Duddon Estuary Site Character

The Duddon Estuary SSSI is formed from the amalgamation of five previously separate SSSIs: Duddon Sands, Sandscale Haws, North Walney, Hodbarrow Lagoon and Haverigg Haws.

Natural England's Citation for the Duddon Estuary SSSI, revised in 1990, describes character of the site, as a whole, as follows[28]:

> *"The mouth of the estuary forms an extensive flat sand plain, with the sands being very mobile. The mid and upper reaches of the estuary are flanked by saltmarsh and beyond high water are extensive sand dunes on both the north and south sides of the mouth of the estuary. These sand dune systems are particularly important for a diverse range of community types, supporting a number of rare and uncommon plants, as well as a variety of nationally rare and scarce invertebrate species. The past activities of the mining and iron-making industries have created a number of artificial habitats which have become areas of wildlife interest. These include the slag banks of Askham Pier and Borwick Rails, and the largest coastal lagoon in north-west England at Hodbarrow Lagoon."*

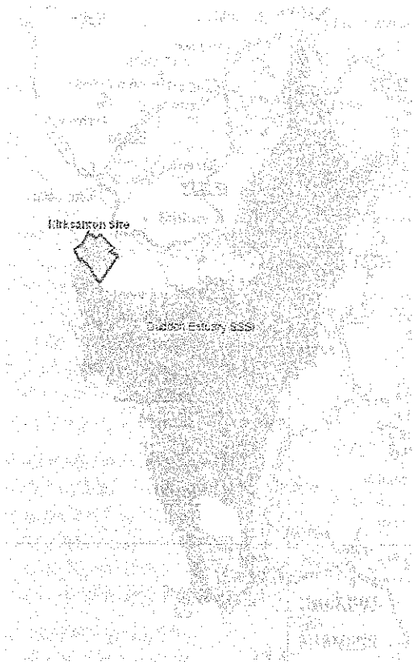


Figure D7.1: Location of the Kirksanton Site with regards to the Duddon Estuary Ramsar Site of Special Scientific Interest

The Kirksanton Site itself lies immediately north-east of the north-western extent of the Duddon Estuary SSSI. Land included within the SSSI designation occupies much of the dune system and shingle beach found between the south-west site boundary and the mean low-water level.

The Natural England citation for the Duddon Estuary describes its importance in terms of the function it provides for birdlife and natterjack toads, as below:

> *"The Duddon Estuary is of international and national importance for wintering wildfowl and waders and provides a vital link in the chain of west coast estuaries used by migrating birds, as well as being of particular importance as one of a series of estuaries on the north-west coast where the majority of the British population of Natterjack Toads occur."*[29]

The Natural England designation describes the main drivers for designation as a SSSI.

- The Duddon Estuary regularly supports wintering waders with internationally important numbers with a further five bird species occurring at nationally important levels;

[28] Duddon Estuary designation

[29] (http://www.english-nature.org.uk/special/sssi/sssi_details.cfm?sssi_id=1000104; Accessed 27 January 2009).

- Extensive areas of saltmarsh occur round the outer edge, and as a whole the site supports the second largest area of saltmarsh in Cumbria after the Upper Solway and Morecambe Bay SSSI;
- Within the Duddon Estuary sand dune systems are well represented making the Estuary the most important site in Cumbria for sand-dune communities;
- The Duddon Estuary is one of the most important areas in Britain for natterjack toads and contains between 18 and 25% of the U.K. population. While particular areas are noted for their concentrations, the species is evenly distributed over the whole estuary.

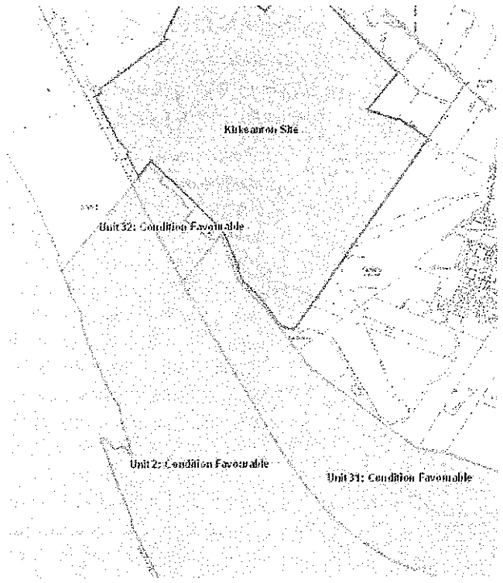


Figure D7.2: Location of Specific Units of the Duddon Estuary SSSI in relation to the Kirksanton Site

The Kirksanton Site itself lies in the immediate vicinity of units 2, 31 and 32 of the SSSI. Descriptions and conditions of SSSI Units for the Duddon Estuary SSSI are reported by Natural England as follows[30]:

- Unit 32 of the Duddon Estuary SSSI comprises the majority of land between the south-western boundary of the Kirksanton Site and the Mean High Water Level and is the closest unit to the nominated site. Natural England describes Unit 32 as comprising supralittoral sediment as

  "Good mosaic with short sward suitable for natterjacks and gorse less than 10% of cover. Shingle and dune unrestricted and mobile".

  The condition of Unit 32 is described as Favourable, as of 3rd October 2008, meaning that the SSSI land is being adequately conserved and is meeting its 'conservation objectives', however, there is scope for the enhancement of these sites.

- Unit 2 of the SSSI takes in the beach area to the southwest of the Kirksanton Site and lying between the Mean High Water Level and the Low Water Level and comprises of littoral sediment of intertidal mud and sand flats. Natural England considers the unit to be in favourable condition (as above). No change is noted in the extent of intertidal mud and sand flats, and no activities are identified that would adversely affect the condition of the mud and sand, or impede natural estuarine processes. Nevertheless, total waterfowl counts are noted to have declined each year since 92/93 and are at lowest levels since 1990 but cannot attribute this to any consistent trend or pattern in/on site environmental factors.

[30] Natural England, Condition of SSSI Units, Compiled 01 Jan 2009; http://www.english-nature.org.uk/Special/sssi/reportAction.cfm?report=sdr13&category=S&reference=1000104; Accessed 18/02/2009

- Unit 31 comprises the area occupying a strip extending approximately 300 m inland from the Mean High Water Level and extending southwards from south of the Kirksanton. Natural England describes this unit to comprise of good shingle bank vegetation and foredunes with a mosaic of bare sandy areas and short herb-rich grassland and marram.

Duddon Estuary Management

Natural England provides detailed proposals for management of a number of related habitats[31]. Of specific relevance to this site are those relating to littoral sediments and sand-dunes owing to the presence of specific SSSI units in the immediate vicinity of the Kirksanton Site.

Natural England describe how management of dune systems should take into account the need to maintain the range of habitats and associated species reflecting the different stages of dune succession.

> *"Dune systems exhibit a degree of dynamism, for example change from blowouts or newly deposited sand, which helps to retain a variety of successional stages within the site. Without management intervention, a mix of dune scrub and woodland may eventually replace the habitats on stable areas of the dune. Selective scrub management and grazing or mowing may be necessary. Where light grazing has traditionally been practised, this prevents the invasion of scrub and it should be continued."*

Natural England further advocates preventing loss of vegetation cover through excessive trampling, limiting access to limit disturbance on breeding birds and also encouraging limited trampling to retain diversity on some sites.

With regards to sand flats in the further vicinity of the site, management focuses on the need to maintain water and sediment quality and on not restricting the current by anthropogenic influences. Natural England further recognise that birds that use sandflats for feeding and roosting are vulnerable to disturbance from human activities which leads to reduced time spent feeding, or individuals being restricted to areas with a poor food supply. Disturbance should therefore be minimised, especially at times when bird populations may be stressed, such as during severe winter weather.

Shaw Meadow and Sea Pasture SSSI

The Shaw Meadow and Sea Pasture SSSI is significantly smaller in area than the Duddon Estuary, occupying in the order of 8 ha of onshore habitats. Shaw Meadow an area of lowland heath, Sea Pasture an area of species-rich wet pasture to the north, and the land to the east which supports a mosaic of heath, mire, gorse scrub and further species rich grassland[32].

Effects of Development at Kirksanton Site

[31] http://www.english-nature.org.uk/special/sssi/sitedocuments.cfm?type=vam&sssi_id=1000104; Accessed 27th January 2009

[32] Natural England Citation for Shaw Meadow and Sea Pasture SSSI, File Ref SD 18/2; http://www.sssi.naturalengland.org.uk/special/sssi/sitedocuments.cfm?type=citation&sssi_id=1002490; Accessed 26 March 2009

Construction and operation of a nuclear power station at the Kirksanton Site would have the potential to result in a range of potential effects to the Duddon Estuary SSSI. Effects would require comprehensive assessment during Environmental Impact Assessment which would be required in advance of consent and development of the site.

Effects that may be expected upon the integrity of the designated area described above include the following:

Vulnerability of the Marine Environment
Possible physical effects on the marine environment may be caused by physical changes to the sea bed during construction associated with a Marine Off-Loading Facility (MOLF), cooling water inlet and outlet infrastructure and through dredging required to maintain marine access.

Operation of the cooling water system could affect the surrounding area in three ways, the release of warm water into receiving waters, the release of biocide into receiving waters, and the impingement and entrainment of free swimming organisms in water entering the cooling water system. Possible effects of the cooling water system are discussed further in Section D10.

Construction and operation of a Marine Off-Loading Facility, to allow large plant items to access to the site from marine vessels via the beach, may result in a degree of disturbance both to beach materials, benthic flora and fauna, and to over-wintering and migrating bird species.

Further physical effects may be experienced by the sea-bed where dredging were required to allow marine vessels to access the MOLF and where dredging were to be disposed of at sea.

Vulnerabilities of Terrestrial Species and Habitats
Development of the nominated site for a new nuclear power station would result in a degree of disturbance to terrestrial habitats at the site. At this strategic state, detailed ecological desk-study or field survey of the site have yet to be completed, although designations for the Duddon Estuary refer to the suitability of habitat for a number of species. Great Crested Newt (*Triturus cristatus*) and Natterjack Toad *Epidalea calamita* (formerly *Bufo calamita*), both of which are protected under schedule 5 of the Wildlife and Countryside Act 1981, are both identified as associated with the designated areas.

Development would also result in development and loss of habitats directly below the developed site footprint. Large areas of calcareous dunes are found at Haverigg Haws are among the habitats identified in affording SSSI status to the area.

Birdlife Vulnerability
Birds that use mud and sandflats for feeding and roosting are vulnerable to disturbance from human activities. Disturbance can lead to reduced time spent feeding, or individuals being restricted to areas with a poor food supply. Construction and operation of a nuclear power station may result in local increases in noise and in light emanating from the site and may therefore have the potential to cause some disturbance to migrating and overwintering birdlife using exposed sand flats at low-tide, for feeding.

The Kirksanton Site occupies land currently used as agricultural land. While land immediately to the south-west of the site includes sand dune progressions and the shingle beach, these have been excluded from the boundary of the nomination and will not be directly affected.

Hydrological Vulnerability
Construction and operation of a new nuclear power station on the nominated site would have the potential to affect hydrological and hydrogeological conditions of the site.

Development of the site would result in a change in a proportion of the current agricultural ground surface to that of an engineered load-bearing surface. This would consequently result in a change the surface water characteristics, particularly with regards to the surface water flow regime and infiltration. During construction, the requirement for earthworks, reprofiling and civil engineering activities at the site would result in possible production of large quantities of dust and sediment run-off that would require management prior to discharge. Construction may also result in possible leaks of polluting materials which would also require interception and management.

In the long-term, engineered surfaces would be expected to result in a reduction of current levels of water infiltration and increased quantities and velocities of surface water run-off.

Effects on Shaw Meadow and Sea Pasture SSSI

Construction and operation would not be expected to extend to the north-west of the nominated site boundary and would remain in the order of 1 km from the Shaw Meadow and Sea Pasture SSSI. Given the area's designation primarily for its plant species, it is not expected that the SSSI would be affected by development at the Kirksanton Site.

Impact Avoidance, Mitigation and Enhancement

Impacts to the Duddon Estuary would primarily be avoided through not allowing physical activities to incur within designated areas. The Kirksanton Site is located at the extreme north-west of the Duddon Estuary's designated site and extends beyond any designated areas. Incursion into areas afforded international ecological designations would not be necessary in order to develop the site.

Prior to detailed design and development, comprehensive desk-study and field survey data should be collated, over a period of multiple seasons, in order to fully obtain the terrestrial habitats and species that the site supports. Based on an understanding of the Kirksanton Site's actual ecological values and functions, detailed design could be conducted with due regard to local ecological conditions, to design-out as far as possible, potential conflict with and impact to ecologically valuable habitats and species.

Further impact avoidance and mitigation would be ensured through development and implementation of a thorough construction and operational environmental management plans. During construction, employment of and adherence to a robust environmental management plan would ensure that potential effects of each aspect of development would be considered and overseen by qualified environmental managers. Appointment of an overseeing Ecological Clerk of Works would provide an ongoing watching brief with regards to potential ecological impacts of specific activities.

In the long-term, environmental management of the plant could look to maximise opportunities for compensation of lost habitat and enhancement of habitats with and surrounding the facility.

Mitigation of Effects on the Marine Environment

Marine offloading, and traffic between a Marine Off-Loading Facility (MOLF) and the site, should avoid areas designated as of international ecological interest, and also those specific areas identified as significant at a site-survey level. Notwithstanding, construction of a MOLF and supporting access would require appropriate attention to be afforded to ensuring that construction activities did not encroach upon surrounding areas. Aspects of the marine environment of particular value would be identified and demarcated to ensure that construction activities avoid these areas.

The MOLF would be removed after its role in construction and commissioning the plant were to be completed. Nevertheless, given that the MOLF will be required for a construction period spanning several years, opportunities for integrating it with the current marine environment could be explored. In particular, surface treatments, to encourage temporary colonisation of marine life, though placement of appropriate rip-rap materials may be adopted.

Cooling water abstraction and discharge infrastructure should, where possible, avoid land designated as of international or other ecological importance. It is noted that the site is located outside estuary, and that the limit designation adjacent to the site does not extend below the mean low water level. As such, it is expected that the location of cooling water infrastructure could ensure sufficient dispersion of cooling water can be achieved without affecting the character of any designated areas.

Mitigation of Effects on Terrestrial Species and Habitats

Development of a nuclear power station at the Kirksanton Site would result in significant change to the nature of terrestrial habitats and species currently found at the site.

As described above, the current agricultural management of the site suggests that habitats are currently subject to active intervention. Nevertheless, where significant habit or species were to be encountered, a range of mitigation approaches may still be adopted.

Areas of valuable terrestrial habitat encountered within the site would be considered for in-situ conservation. Where safety or other site development constraints determine this to be inappropriate, ex-situ habitat compensation and enhancement of surrounding land parcels may be appropriate. Enhancement would also be considered to ensure continued connectivity of key habitat corridors and prevention of fragmentation. Translocation of species, followed by securing the site to prevent recolonisation prior to development would also ensure mitigation of impact to terrestrial species.

Timing of works would be programmed to avoid periods of specific vulnerability to species identified during site surveys.

Mitigation of Effects to Birdlife

Measures to mitigate possible impacts to birdlife have already be significantly influenced through avoidance of areas designated as of national ecological significance. Construction impacts to bird populations of the Duddon Estuary could further be mitigated by timing operations to minimise conflict between construction operations and times of the year when important bird concentrations are assembled. Screening of construction areas and operations would be essential to contain disturbance effects. Restriction of access by personnel away from the construction site would control the effects of direct human interference which visual and acoustic screening may also mitigate the effects of noise and visual interference to birds in neighbouring areas. Subsidiary lights can also be placed to detract birds from tall, high powered lights.

Development of the site would also introduce the opportunity for ecological enhancements in terms of exploring opportunities for landscaping and enhancing provision for conservation opportunities.

Mitigation of Hydrological Effects

Construction activities have the potential to result in production of quantities of sediment, polluting materials and also to affect the natural hydrological regime of the site to affect the designated habitats of the Duddon Estuary. Environmental management of the construction

process would be required to control and prevent construction activities from resulting in deleterious effects on the SSSI.

As a component of the detailed site design, permanent drainage infrastructure would be subject to approval of various regulatory agencies including the Environment Agency and Nuclear Industries Inspectorate. Surface waters would require management such that extreme flood events would not inundate the site, nor require discharge of untreated or polluted effluent streams.

In accordance with current regulatory requirements, potentially polluting liquids would require storage in appropriately bunded areas and management according to Environment Agency guidance.

D8: Supporting Document Reference 011: Statement on Areas of Amenity, Cultural Heritage and Landscape Value

The location of the Kirksanton Site, as described in Section A1, has been considered with regards to its proximity and potential effect upon a range of features of national amenity designation, high amenity, landscape and cultural heritage value. The discussion below, together with sites described in Figure D8.1, describes possible effects of development at the Kirksanton Site on areas of amenity, cultural heritage and landscape value.

UNESCO World Heritage Sites

There are no UNESCO World Heritage Sites within 30 km of the Kirksanton Site. The closest is 'Hadrian's Wall Buffer Zone', which located over 30km north.

Scheduled Monuments

There are no Scheduled Monuments at the Site. The closest Scheduled Monuments is the 'Giant's Grave Standing Stones' (Monument No 23737), which is located approximately 500 m north of the Kirksanton Site. A further seven Scheduled Monuments are described within 2.5 km of the site, although none of these are directly affected by the nominated site boundary[33].

Protected Wreck Sites

There are no Protected Wreck Sites within 30 km of the Kirksanton Site[34].

National Parks

The Kirksanton Site is located in the order of 300 metres from the boundary of the 'Lake District National Park'.

Area of Outstanding Natural Beauty

The Kirksanton Site is over 30 km from any designated Area of Outstanding Natural Beauty.

National Scenic Areas (Scotland)

The Kirksanton Site is over 30 km away from, and not visually linked with any National Scenic Areas (Scotland).

Listed Buildings

The closest Listed Buildings are the Grade II former Bankspring Brewery and its associated Limekiln, located approximately 750 m north east of the Kirksanton Site.

The closest Grade I Listed Building is 'Millom Castle', which, located over 3 km east of the Kirksanton Site, is considered sufficiently distant, and screened by natural features and settlements, to be unaffected.[35]

Conservation Areas

There are no designated conservation areas in the immediate vicinity of the Kirksanton Site. The closest identified Conservation Areas are Ravenglass Conservation Area in Copeland Borough (18 km north) and Ireleth Conservation Area in Barrow Borough (9 km south-east).

[33] English Heritage GIS Dataset of Scheduled Monuments. http://services.english-heritage.org.uk/NMRDataDownload/; Accessed 23/03/2009

[34] English Heritage GIS Dataset of Protected Wreck Sites. http://services.english-heritage.org.uk/NMRDataDownload/; Accessed 23/03/2009

[35] English Heritage GIS Dataset of Listed Buildings. http://services.english-heritage.org.uk/NMRDataDownload/; Accessed 23/03/2009

Areas of Archaeological Importance

The site does not affect any areas identified as Areas of Archaeological Importance under the Ancient Monuments and Archaeological Areas Act 1979.

Cumbria County Council's Historic Environment Record (HER) for the Kirksanton Site has been integrated. The HER provides records of two recorded findings of WWII remains within the Kirksanton Site, although provides no specific evidence to suggest that development would compromise local heritage resources.

Local Amenity Sites

The RAF Millom Aviation and Military Museum is sited approximately 1 km east of the Kirksanton Site. RAF Millom is no longer operational and the airfield is now the site of the Haverigg Wind Farm. As such the Museum would not be directly affected by development at the Kirksanton Site. The surrounding areas also support tourist activities, with the Millom Folk Museum located in the town of Millom, the Hodbarrow Nature Reserve occupying a former quarry approximately 3 km east of the site and the path of the Cumbria Coastal Way, passing south-west of the Kirksanton Site boundary.

Potential Effects

Development of a new nuclear power station at the Kirksanton Site will not directly affect land containing features of national amenity, cultural heritage or landscape described above as none are included within the boundary of the nominated area. Development of a new nuclear power station at the site may, however, have the potential to impact upon the setting of selected features of landscape and cultural heritage interest, as described below:

As a result of the proximity of the Kirksanton Site with the boundary of the Lake District National Park, some degree of intervisibility of the national park and a nuclear power station at the Kirksanton Site would be expected from selected view-points within the National Park. The extent of the visual effect would be dependant on the form and configuration of plant, although it is expected that use of cooling towers would significantly increase the degree of visibility and therefore the indirect effect.

Development of a nuclear power station at the Kirksanton Site may also affect the setting of the Giant's Grave Standing Stones Scheduled Monument. The Monument would not be expected to be directly affected, although its setting may be influenced through its proximity with a major infrastructure installation. As with the potential effects on the Lake District National Park, use of cooling towers at the Kirksanton Site would result in an increased significance of impact. The settings of other Scheduled Monuments and listed buildings within the vicinity of the Kirksanton Site (described above) would also be variously affected, depending on the significance of visibility with any development at the site.

Impact Mitigation

While development will not directly affect the National Park and the site boundary lies exclusively beyond the national park boundary, the potential effects on the setting of the Lake District National Park and views from the National Park will be afforded due consideration during scheme design.

The site offers local opportunities for screening through the use of landscaping, vegetation and tree planting and through choice of type, scale, orientation and surface treatment of plant employed at the site. Use of direct sea-water cooling would reduce potential visual intrusion from tall or hybrid cooling towers, while cooling tower dispersion plumes will not occur.

Effects on Scheduled Monuments, particularly the Giant's Grave Standing Stones Scheduled Monument, would primarily be mitigated through avoidance of the site and its immediate setting. Prior to any invasive works, opportunity may also be sought to ensure in-situ or ex-situ preservation of related unknown heritage resources through undertaking appropriate archaeological investigations prior to, and during site development

Development of a nuclear power station on the Kirksanton site would be expected to remain subject to Environmental Impact Assessment, as required by Directive 85/337/EC as amended by 97/11/EC and 2003/35/EC. As such, prior to development, impacts on landscape, heritage and other amenity resources, at the international, national, regional and local level, would be expected opportunities for residual environmental impacts explored.

D9: Supporting Document Reference 012: Statement on Size of site to Accommodate Operations

The area required to securely operate a new nuclear power station is considerably larger than the area required for the station buildings themselves. Our assessment of land requirements indicate that an area of 30 to 50 ha would be required for the permanent site of a single nuclear power unit, providing for the operation, maintenance, spent fuel and intermediate level waste storage activities. This area would also be sufficient to permit the construction of any cooling towers if they are required at this particular location. Any additional units would require less incremental space. The developable area allows further for allocation of an appropriate requirement of land to allow for ensuring a secure site perimeter and for control and restriction of access to site.

The Kirksanton Site boundary, as described in Section A1, encompasses approximately 131 hectares of developable land and is therefore large enough to meet the land requirements and satisfy the requirements of the Strategic Site Assessment criterion.

At this stage the site is being nominated on the basis of a technology neutral approach to development, and while no preferred reactor or configuration is currently proposed, consideration has been afforded to technology going through the Generic Design Assessment process. The actual land footprint of the nuclear power station will depend on the number of nuclear units constructed, the choice of nuclear technology, the cooling methodology adopted, and other factors that could affect layout. However consideration has been afforded to generic plant footprints and expectations of the maximum area required for spent fuel in addition to other supporting and ancillary infrastructure including, where necessary, the need for cooling towers.

The area as described in Section A1 does not at this time include allowance for areas that may be required in tidal or coastal areas to support the need for supporting infrastructure, which may include Marine Off-Loading Facilities (MOLF) and cooling water inlets and outfalls, which may extend in the order of 3 km offshore. The actual locations, orientations and scale of such facilities will be determined through detailed survey investigation and plant design.

D10: Supporting Document Reference 013: Statement on Access to Suitable Sources of Cooling

Cooling Water Options

All power stations with steam turbines need cooling to condense the steam leaving the turbines. The steam should be condensed at as low a temperature as possible, as this has a significant effect on both the efficiency and output of the power station. The available cooling options at the Kirksanton Site would be either:

- Direct Water Cooling;
- Indirect Water Cooling; or,
- Air Cooling.

Direct Water Cooling

This option would involve pumping sea water from the sea through the turbine condensers and returning the water to the sea at a temperature slightly warmer than the intake. This option would give the lowest cooling water temperature, thereby maximising plant efficiency.

Indirect Water Cooling

This option would also use sea water as the cooling medium, but the sea water would be cooled with air in cooling towers. The resultant cooling water temperatures would be higher than those achieved with direct cooling, and plant efficiencies would therefore be lower although less water would need to be abstracted than in a direct cooled system.

Air Cooling

This option would involve condensing the exhaust steam in large air cooled condensers (ACC), over which air is drawn using fans. An ACC produces a very high steam condensation temperature and would require considerable use of electric power to operate the fans. Use of such a system would cause a significant reduction in plant efficiency. No ACC of the size that would be required at the site have previously been built. This would not be a preferred option where alternatives are available.

From the above, it can be seen that the efficiency advantages of direct cooling mean that it would be the preferred option. A primary factor in the selection of the Kirksanton Site has been its coastal location which lends itself to direct seawater cooling. Proximity of the site with the Irish Sea provides an abundance of seawater suitable both for abstraction of cooling water, and for dispersion of discharged cooling water.

Cooling Water Abstraction

A nuclear power station at the Kirksanton Site employing direct seawater cooling would draw water from the Irish Sea and pump it to the power station site. The number, length and location of tunnels or pipework will be determined by detailed hydrological studies and depend on a range of factors including the size of the plant to be employed, the nature of the reactor technology (although this is confirmed as being conformant to GDA) , phasing issues and the permissible temperature differential at the outlet. Intake water will be delivered to a pumping station located below ground and pumped to the condensers. Owing to the absence of significant rivers or freshwater bodies in the vicinity of the site, indirect cooling would be required to abstract water from the Irish Sea.

Cooling Water Discharge

With employment of a direct cooled system, following cooling, water will be discharged to the Irish Sea in an outfall culvert of similar diameter to the intake culvert. Cooling water will be

discharged at a location and temperature suitable to ensure dispersion of cooling water plumes without significant effect to marine ecology and to avoid entrainment and recirculation of discharged cooling water.

Local Limitations

There are no local considerations that are currently considered a limitation to the employment of direct (once-through) cooling with sea-water. Thermal entrainment within the Irish Sea would be overcome by selecting appropriate locations of discharge pipes and by discharging water to areas subject to suitable levels of dispersion.

On a terrestrial level, employment of direct sea-water cooling at the site avoids the requirement for significant quantities of land-take to accommodate cooling towers. This therefore enables the site to be developed without the need for significant additional land required for terrestrial cooling water infrastructure.

It is acknowledged that employment of once-through cooling would demand supporting thermal plume dispersion characteristics. The Irish Sea has, in the past, been subject to studies which have demonstrated the efficacy of once through cooling where appropriate abstraction and discharge locations are chosen with appropriate regard to bathymetric, tidal and other oceanographic characteristics.

Construction Environmental Impacts of Direct Cooling and Impact Management

Installation of the cooling water intake and outfalls could have impacts on marine habitats. Construction may involve dredging and disposal of excavated material, which could cause sediment release to the surrounding marine environment.

Any marine disposal should be done away from sensitive fisheries or breeding grounds and timed to be outside of the upwelling period. Marine construction activities associated with the cooling water intake and outfalls systems would be performed during periods of low fish activity.

Operational Impacts of Direct Cooling and Impact Management

Operation of the Cooling Water System (CWS) could affect the surrounding area in a number of ways including thermal effects from the release of warm water into receiving waters, the release of biocide into receiving waters and the impingement and entrainment of free-swimming organisms in water entering the CWS.

Temperature Uplift Effects

The impacts of thermal discharge on the marine ecosystem would be expected to vary depending on the habitat and the degree of mobility of the species present. Benthic organisms spend long periods of their life cycle within small areas and so would be permanently exposed to the prevailing physical conditions. Planktonic organisms are suspended in the water column and would move with the prevailing currents, both into and out of the area affected by thermal uplift. Free swimming species such as marine mammals, fish and some invertebrates may swim into or out of the affected area. Many of these mobile species, however, are also capable of avoidance, through swimming away from adverse condition.

Once-through plant cooling water that is discharged to the sea would result in plumes of locally elevated temperatures in the vicinity of the discharge location. Through a combination of thermal impact modelling and an understanding of sensitive areas of marine ecology, cooling water systems will be designed to ensure that discharge would avoid significant environmental impact to marine life.

Biocide Effects

It is expected that use of once-through cooling would employ use of biocides to control biofouling in the cooling water systems. In general, biocide would be used at levels such that only the more concentrated levels, found within the cooling water system, would be capable of lethal or other significant impacts on marine life. Use of intake screens would further ensure that larger marine species were not drawn into the cooling water system and would not be significantly affected by biocide treatment.

Modelling of biocide dispersion effects would be conducted to determine appropriate dose levels such that residual biocide half lives would not result in significant marine environmental effects.

Impingement and Entrainment

Operation of the cooling water system would involve the continual intake of large volumes of water. Organisms present in the intake waters may be drawn into the cooling water system and either impinge on the intake screen or, if smaller than the mesh size, pass through the cooling water system.

Detailed design of cooling water inlet location and of the inlet size and spacing will ensure that inlet velocities are selected with regards to swimming speeds of vulnerable species. and inlet bars prevent large fish from being entrained in the system.

Visual Effects

Direct seawater cooling would be expected to have a negligible visual impact. The majority of cooling water infrastructure will be below ground and below sea-level, with no additional need for large scale vertical plant items, cooling towers or atmospheric plume.

Regulatory Aspects

Prior to operation of a nuclear power station located at the Kirksanton Site, the permissible discharge temperature for cooling water will be agreed with the appropriate statutory authorities. Any permitted temperature gradient, in terms of the difference in the temperature of discharged cooling water to that of the ambient water, will be affected by the rate of abstraction and water use in cooling, and rate of cooling water circulation can be employed to ensure, where appropriate, reductions in the discharge cooling water temperature gradient. Engineering solutions, in terms of changing the rate of circulation of water and the physical characteristics of inlet and discharge points, may be adopted as engineering solutions to alter performance. In support of this, a monitoring regime will also be agreed to ensure that compliance is measured.

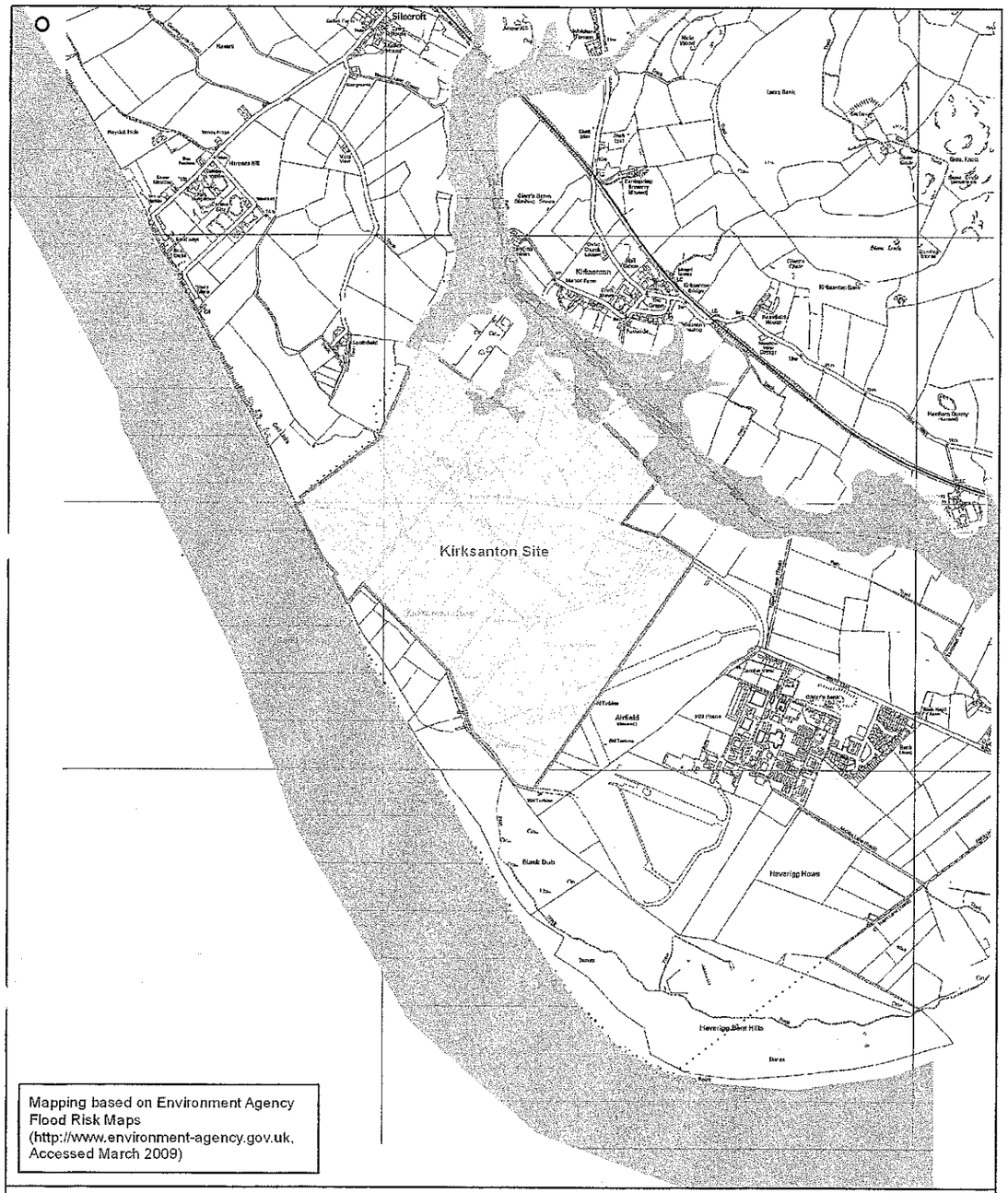
Long-term Considerations

Availability of seawater for cooling will not be affected over the lifetime of the plant. Predictions by the UK Climate Impact Programme for sea-level change, included in Table B.1 of PPS25[36], project a trend of gradual sea level rise with levels in 2075 (allowing 50 years of operation beyond 2025) expected in the order of 585 mm elevated on those currently observed. UKCIP projections do not anticipate reductions in sea levels for the north-west of the UK, while extreme weather events would not be expected to cause temporary limitations to sea-water availability or the ability to provide cooling.

[36] DCLG, 2006. Planning Policy Statement 24: Development and Flood Risk, Department for Communities and Local Government, December 2006

Alternative Cooling Regimes

In the event that direct cooling were to be not feasible, then the alternative cooling regime would be either indirect cooling using seawater cooling towers or a hybrid system employing a combination of direct cooling and cooling towers. Impacts associated with a hybrid system would reflect those associated with direct cooling, although to a lesser extent in relation to reduced demands for abstraction and discharge. Other impacts would be those commonly associated with the use of cooling towers and include the visual impact of the tower, the visual impact of the vapour plume, noise effects from falling condensed water and the additional space required for construction of towers.



Legend

- Kirksanton Site
- Flood Zone 2 - Medium Probability
- Flood Defences
- Flood Zone 3 - High Probability

Client
RWE Npower Plc

Job Title
Kirksanton Site Nomination

Drawing Title
Environment Agency Flood Risk Zones

Issue	Date	By	Chkd	Appd
P1	27/03/2009	IDR	IDR	IDR

ARUP

Arup Nottingham
3rd Floor The Frontage, Queen Street, Nottingham. NG1 2BL
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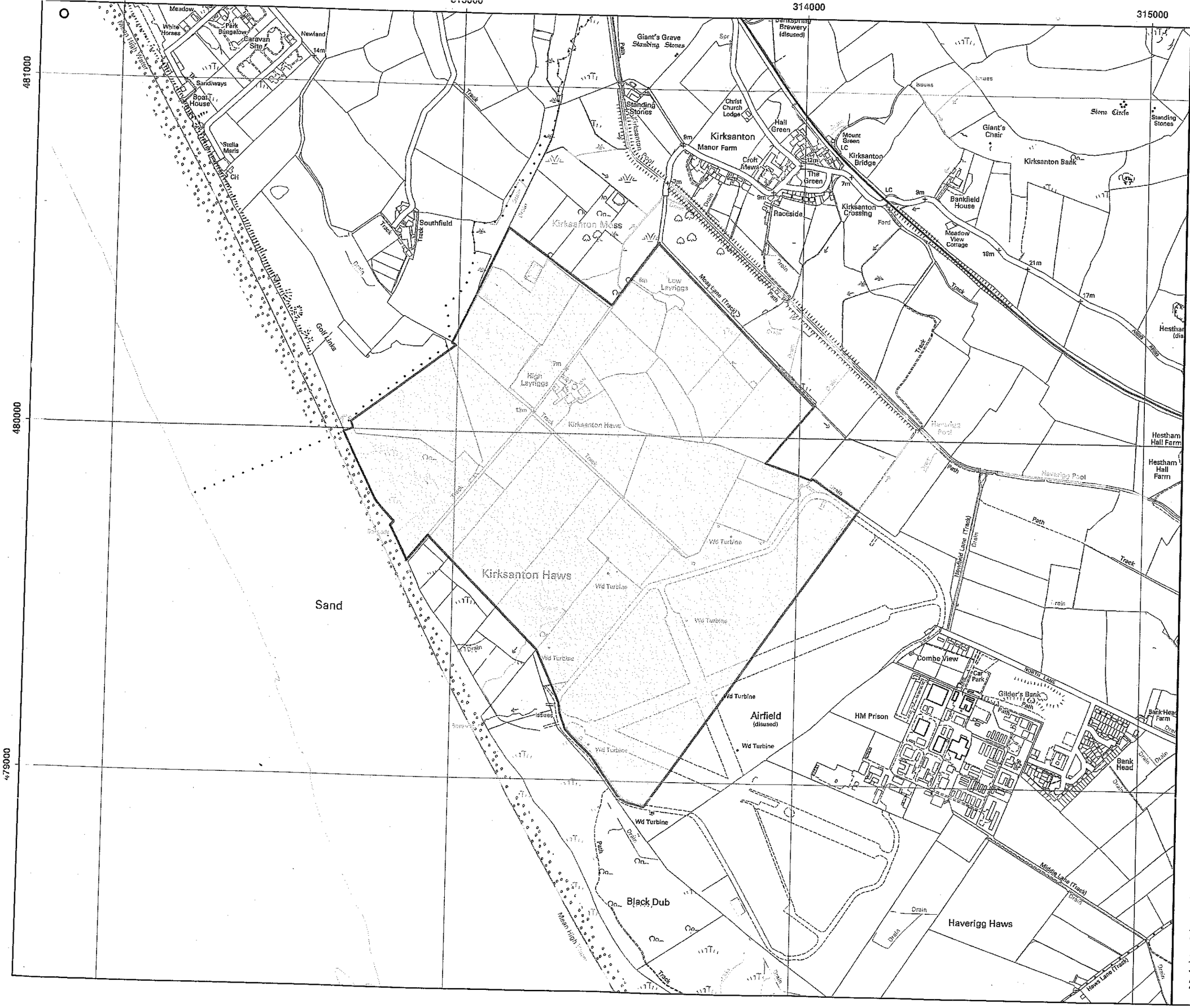
www.arup.com

Scale at A4
1:20,000

Drawing Status
Issue

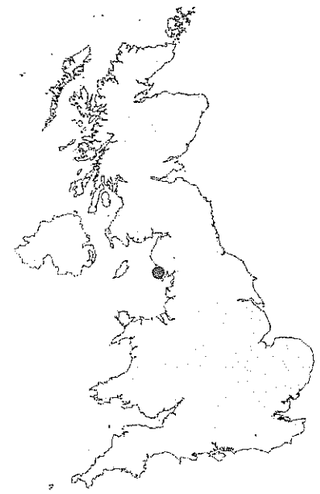
Job No	Drawing No	Issue
207894-00	Figure D1.1	P1

oFileLocation



Legend

Kirksanton Site



The site boundary relates only to onshore construction and it should be noted that both a marine off-loading facility, and inlet and outfall pipes will be required in coastal/marine

Issue	Date	By	Chkd	Appd
P1	01-02-08	TSS	RM	EP

Metres
0 125 250 500

Job Title
Kirksanton Site Nomination

Drawing Title
Site Location

Scale at A3
1:10,000

Drawing Status
Issue

Job No	Drawing No	Issue
207894	Reference 001	P1

oFileLocation