Scotland England Green Link 2 - English Onshore Scheme

Appendix 11B Flood Risk Assessment

National Grid Electricity Transmission

May 2022

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
Rev 1	07 April 2022	DRAFT			
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Executive Summary

Scheme Name	Scotland England Green Link 2 (SEGL2) English Onshore Scheme
Location	East Riding of Yorkshire / Selby District
Client	National Grid
Grid Reference	TA 16904 63447 (start point) and SE 67133 27138 (end point)
Area	Length of cable route: approximately 69 km Area of permanent converter station: 5ha
EA Flood Zone Classification	Mixed coverage
Current Site Use	Mixed Use
Description of Proposed Scheme	English Onshore Scheme of a subsea High Voltage Direct Current (HVDC) cable link from Peterhead to Drax power station. The English Onshore Scheme includes horizontal directional drilling (HDD) pits, construction compounds, joint bays, haul roads and cable trench, which are temporary works and a converter which is permanent infrastructure.
Vulnerability Classification	Essential Infrastructure (utility)
History of Flooding	Some sections are within with locations that have flooded in the past.
Flood Defences	Some sections pass through locations with existing flood defences.
Summary of Pre-development Risks	The proposed route and converter station site incorporate all levels of flood risk from very low to high. The levels of risk are dependent on the individual route sections, see section 5.8.

1. Introduction

1.1 Requirement

Capita has been commissioned by National Grid Electricity Transmission (NGET), to undertake a Flood Risk Assessment (FRA) to support a planning application for the Scotland – England Green Link 2 (SEGL2) English Onshore Scheme (EOS).

The purpose of this FRA is to identify all sources of flood risk to the proposed EOS and those that would potentially arise from the development. The FRA has been prepared in compliance with the National Planning Policy Framework (NPPF) (Ref 1) 2021 revision, the Planning Practice Guidance (PPG) (Ref 2), Overarching National Policy Statement for Energy (EN-1) (Ref 3) and National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref 4).

This FRA is part of supporting information for an Environmental Statement (ES).

1.2 Development Proposals

SEGL2 is being developed between NGET and Scottish and Southern Energy Network (SSEN). SEGL2 is a subsea High Velocity Direct Current (HVDC) electricity transmission link between Peterhead substation in Aberdeenshire, Scotland and Drax substation in North Yorkshire, England. It comprises approximately 507 km of HVDC onshore and offshore electricity transmission cables between new converter stations at each end of the electricity transmission link. These in turn are connected to the high voltage electricity transmission networks via existing substations at Peterhead and Drax.

The EOS involves laying approximately 69 km of underground HVDC cables in East Riding of Yorkshire and Selby District, a district of North Yorkshire from the landfall at Fraisthorpe beach to a converter station close to the existing Drax Substation in Selby, passing Driffield, Market Weighton, and Howden. The converter station will be connected to the existing substation by approximately 500 m of High Voltage Alternative Current (HVAC) underground cable. HVDC cables will pass underneath watercourses that are intersected by the EOS, and watercourses will be bridged or culverted where necessary to accommodate a temporary haul road along the majority of the route to facilitate construction. The section of the EOS in the East Riding of Yorkshire only includes temporary works, the section of the EOS in Selby District includes temporary works and all permanent infrastructure.

This FRA relates only to the EOS of SEGL2.

1.3 Report Objectives

The contents of this FRA describes potential flood risk both to and arising from the EOS. The aim of this assessment is to provide the level of detail necessary to demonstrate that the potential effects of flood risk have been addressed by:

- identifying any sources of flood risk to the EOS and associated temporary construction infrastructure;
- determining the consequences of flooding to and from the EOS and advising on how this will be managed, if necessary;
- proposing appropriate mitigation measures if applicable, to reduce the adverse effects of flooding; and
- demonstrating the flood risk issues described in this assessment are compliant with the relevant guidance.

1.4 Limitations and Assumptions

This report relies on publicly available information and information from suppliers which Capita assumes to be correct. Capita cannot and does not verify accuracy of this data, and it is outside the scope of this commission to do so.

1.5 Sources of Information

Sources of information used for the compilation of this report include:

- SuDS Manual (2015) (Ref 5);
- East Riding Local Plan 2012-2029 (Adopted 2016) (Ref 6);
- East Riding of Yorkshire Council Strategic Flood Risk Assessment (2019) (Ref 7);
- East Riding of Yorkshire Council Local Flood Risk Management Strategy 2015-2027 (2015) (Ref 8);
- East Riding of Yorkshire Preliminary Flood Risk Assessment (2011) (Ref 9);
- North Yorkshire County Council Local Flood Risk Management Strategy (Ref 10).
- Selby District Core Local Strategy Local Plan (Adopted October 2013) (Ref 11);
- Selby District Council Local Plan Preferred Options Consultation 2021 (Ref 12);
- Selby District Council Level 1 Strategic Flood Risk Assessment (2020) (Ref 13);
- Selby District Council Level 2 Strategic Flood Risk Assessment (2021) (Ref 14)
- Ouse Catchment Flood Management Plan (2010) (Ref 15);
- Hull and Coastal Streams Catchment Flood Management Plan (2010) (Ref 16);
- Humber River Basin Management Plan (2009) (Ref 17);
- EA website – 'Flood Map for Planning' (Accessed 28/09/2021) (Ref 18);
- EA website – 'Long Term Flood Risk Map' (Accessed 28/09/21) (Ref 19);
- Cranfield Soil and Agrifood Institute - Soilscapes Viewer' (Accessed 28/09/21) (Ref 20);
- British Geological Survey (BGS) website – 'Geology of Britain Viewer' (Accessed 28/09/2021) (Ref 21);
- River Hull and Holderness Drain Flood Mapping Study (2013) (Ref 22);
- Mill Dike (Market Weighton) EA Flood Mapping Study (2007) (Ref 23);
- 2013 Upper Humber Modelling Study (Ref 24); and
- Humber Tributaries Model 2020 (Ref 25);

2. Policy and Guidance

2.1 Flood and Water Management Act (2010)

Combined with the Flood Risk Regulations 2009 ('the Regulations'), which enact the European Union (EU) Floods Directive in the England and Wales, the Flood and Water Management Act 2010 ('the Act') places significantly greater responsibility on local authorities to manage and lead on local flooding issues. The Act and the Regulations together raise the requirements and targets Local Authorities need to meet, including:

- playing an active role leading Flood Risk Management;
- development of Local Flood Risk Management Strategies (LFRMS);
- implementing requirements of Flood and Water Management legislation;
- development and implementation of drainage and flooding management strategies; and
- responsibility for first approval, then adopting, management and maintenance of Sustainable Drainage Systems (SuDS) where they service more than one property.

The Act also clarifies three key areas that influence development:

1. **SuDS:** following the implementation of the Act, a provision for a national standard to be prepared on SuDS was indicated. However, in December 2014, the Department for Communities and Local Government (DCLG) announced that Schedule 3 would not be enacted in England with SuDS being dealt with by strengthening existing planning policy instead. The changes took effect on 6th April 2015, requiring local planning authorities to make the final decision about the suitability of the SuDS provision on new developments. Further information released in the DCLG December 2014 statement (Ref 26) included the need to "ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development".
2. **Flood risk management structures:** the Act enables the Environment Agency and local authorities to designate structures such as flood defences or embankments owned by third parties for protection if they affect flooding or coastal erosion. A developer or landowner will not be able to alter, remove or replace a designated structure or feature without first obtaining consent from the relevant authority.
3. **Permitted flooding of third-party land:** the Environment Agency and local authorities have the power to carry out work, which may cause flooding to third party land where the works are deemed to be in the interest of nature conservation, the preservation of cultural heritage or people's enjoyment of the environment or of cultural heritage.

2.2 National Planning Policy Framework (NPPF) (2021)

In determining an approach for the assessment of flood risk for the proposal there is a need to review the policy context. The NPPF requires that consideration be given to flood risk in the planning process. The NPPF was issued in March 2012 but updated most recently in July 2021 and outlines the national policy position on development and flood risk assessment.

The NPPF states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary in flood risk areas, it can be permitted provided it is made safe for its lifetime without increasing flood risk elsewhere. The essence of NPPF is that:

- local plans should be supported by a Strategic Flood Risk Assessment (SFRA) and develop policies to manage flood risk from all sources, taking advice from the Environment Agency and

other relevant flood risk management bodies, such as lead local flood authorities and internal drainage boards;

- plans should apply a sequential, risk-based approach to the location of development;
- polices in development plans should outline the consideration that will be given to flooding issues, recognising the uncertainties that are inherent in the prediction of flooding and that flood risk is expected to increase as a result of climate change;
- planning authorities should apply the precautionary principle to the issue of flood risk, using a risk-based search sequence to avoid such risk where possible and managing it elsewhere;
- the vulnerability of a proposed land use should be considered when assessing flood risk;
- where appropriate, applications should be supported by a site-specific flood risk assessment;
- planning authorities should recognise the importance of functional floodplains, where water flows or is held at times of flood, and avoid inappropriate development on undeveloped and undefended floodplains; and
- development is based on the concept of Flood Risk Reduction, particularly in circumstances where development has been sanctioned on the basis of the “Exception Test”.

The NPPF sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed. The main steps to be followed are designed to ensure that if there are better sites in terms of flood risk, or a proposed scheme cannot be made safe, it should not be permitted.

2.3 Planning Practice Guidance (PPG) Flood Risk and Coastal Change (2021)

The accompanying planning practice guidance to the NPPF provides additional guidance to local planning authorities. This is to ensure the effective implementation of the planning policy set out in the NPPF on development in areas at risk of flooding.

The PPG documents provide guidance on how the local planning authorities should:

- assess flood risk;
- avoid flood risk; and
- manage and mitigate flood risk and coastal change.

The planning practice guidance provides supporting information on:

- the application of the sequential approach and Sequential and Exception Tests including;
  - measures to reduce flood risk to acceptable levels;
  - how to manage residual risks; and
  - guidance on how to take climate change into account.

Amendments in April 2015 to the PPG for Flood Risk and Coastal Change updated the current guidance to ensure the implementation of planning policy. The update provided additional guidance on SuDS including:

- the importance of SuDS;
- when SuDS should be considered;
- the SuDS discharge hierarchy;
- factors a local authority will address when considering SuDS as part of a planning application;

- when SuDS are inappropriate and relevant flood risk consultees;
- applicability of Defra's Non-statutory Technical Standards for Sustainable Drainage Systems;
- design and construction cost considerations;
- operation and maintenance considerations; and
- where to go for further SuDS advice.

As part of the April 2015 update, the House of Commons Written Statement (HCWS161) on SuDS indicated that "*The Government's expectation is that sustainable drainage systems will be provided in new developments wherever they are appropriate. To this effect, we expect local planning policies and decisions on planning applications relating to major development to ensure that sustainable drainage systems for the management of run-off are put in places, unless demonstrated to be inappropriate. Under these arrangements, in considering planning applications, local planning authorities should consult the relevant lead local flood authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development*".

The November 2016 update clarified the potential need for a Flood Risk Activity Permit for works within 8m of a non-tidal or 16m of a tidal main river watercourse, flood defence structure or culvert.

The PPG was most recently updated in August 2021 in regard to Permitted development rights and flood risk.

2.4 Overarching National Policy Statement for Energy (EN-1) (2011)

The Overarching National Policy Statement for Energy (EN-1) was designated in 2011. This National Policy Statement (NPS) sets out the Government's policy for delivery of major energy infrastructure. Section 5.5 of this NPS covers costal change and states that *"Where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures".*

Section 5.7 of this NPS covers flood risk and states that "*Applications for energy projects of 1 hectare or greater in Flood Zone 1 […] and all proposals for energy projects located in Flood Zones 2 and 3 […] should be accompanied by a flood risk assessment (FRA)."* And that the FRA should *"identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account.*

The minimum requirements for FRAs are that they should:

- *be proportionate to the risk and appropriate to the scale, nature and location of the project;*
- *consider the risk of flooding arising from the project in addition to the risk of flooding to the project;*
- *take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;*
- *be undertaken by competent people, as early as possible in the process of preparing the proposal;*
- *consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure;*
- *consider the vulnerability of those using the site, including arrangements for safe access;*
- *consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;*

- *consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;*
- *include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project;*
- *consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems;*
- *consider if there is a need to be safe and remain operational during a worst case flood event over the development's lifetime; and*
- *be supported by appropriate data and information, including historical information on previous events."*

Section 5.15 of this NPS covers water quality and recourses and states that *"*Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent*"*.

An update to this NPS (Ref 28) has been consulted on but at the time of this assessment has not been designated and listed as Draft. The draft update contains minor updates to the NPS to bring it in line with similar updates to the NPPF and NPPG including requirements to:

- consider a range of climate scenarios,
- consider safe escape from the development,
- include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration for a range of sources of flooding
- identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management

There is also a change in emphasis to move away from the consideration if there is a need for the development to be safe and remain operational during a worst case flood event over the development lifetime to the assumption that development will need to remain safe and operational during this flood event. There is also a new requirement to detail those measures that will be included to ensure this without increasing flood risk elsewhere.

2.5 National Policy Statement for Electricity Networks Infrastructure (EN-5) (2011)

Like EN-1 the National Policy Statement for Electricity Networks Infrastructure (EN-5) was designated in 2011. This NPS taken together with EN-1 described above, provides the primary policy for decisions taken by the Secretary of State on applications it receives for electricity networks infrastructure. Route section 2.4 of this NPS covers climate change adaption and resilience and states that "*As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, or in situations where it is located near the coast or an estuary or is underground, applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to:*

- flooding, particularly for substations that are vital *for the electricity transmission and distribution n*etwork;
- the effects of wind and storms on overhead lines*;*
- higher average temperatures leading to increased transmission losses*;*
- earth movement or subsidence caused by flooding or drought (for underground cables)"

Also like EN-1 a draft update to this NPS (Ref 28) has been consulted on but at the time of this assessment has not been designated and listed as Draft. The draft update contains minor updates to the NPS to bring it in line with similar updates to the NPPF and NPPG including requirement to assess flood risk in light of changes to groundwater levels resulting from climate change.

2.6 The SuDS Manual, CIRIA (2015)

This guidance provides best practice on planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.

It looks at how to maximise amenity and biodiversity benefits and deliver the key objectives of managing flood risk and water quality. There is also supporting information covering topics such as materials, landscape design, maintenance, community engagement, and costs and benefits.

The information presented in the publications is a compendium of good practice, based on existing guidance and research both in the United Kingdom (UK) and internationally, and the practical experience of the authors, project steering group, and industry.

The guidance provides the framework for designing SuDS with confidence and to maximise benefits. Its contents are relevant for a wide-range of professions, and roles, and it highlights that through engagement and collaboration SuDS can be integrated into the design of urban areas, to create high quality places for future generations.

The SuDS Manual has been used to provide the necessary design guidance for the surface water drainage strategy.

3. Local Policy and Plans

3.1 East Riding Local Plan 2012-2029 (Adopted April 2016)

The East Riding Local Plan is the current version of the Local Development Plan (LDP) adopted in April 2016 for the East Riding of Yorkshire Council (ERYC). It is a portfolio of planning documents that together provide the framework for managing development and addressing key planning issues in the East Riding of Yorkshire Council area.

Policy ENV6: Managing Environment Hazards' has particular reference and importance to flood risk:

- *'A - Environmental hazards, such as flood risk, coastal change, groundwater pollution and other forms of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment:*
- *B - The risk of flooding to development will be managed by applying a Sequential Test to ensure that development is steered towards areas of lowest risk. Where development cannot be steered away from Flood Zone 3, the sub-delineation of Zone 3a, will be used to apply the Test, with preference given to reasonably available sites that are in the lower risk/hazard zones. Where necessary, development must also satisfy the Exception Test.*
- *C – If, following application of the Sequential Test, it has not been possible to develop in Flood Zone 1, a Sequential Approach will be taken to site layout and design, aiming to steer the most vulnerable uses towards the lowest risk parts of the site.*
- *D – Flood risk will be proactively managed by ensuring new developments:*
  - *Limit surface water run-off to existing run-off rates on greenfield sites, and on previously developed land reduce existing run-off rates by a minimum of 30%, or to greenfield run-off rate and incorporate Sustainable Drainage Systems (SuDS) unless demonstrated to be inappropriate;*
  - *Do not increase flood risk elsewhere;*
  - *Do not culvert or otherwise build over watercourses, unless supported by the Risk Management Authority and are adequately set-back from all watercourses including culverted stretches;*
  - *Have a safe access/egress route from/to Flood Zone 1 and incorporate high levels of flood resistant and resilient design if located in a flood risk area; and*
- *Supporting proposals for sustainable flood risk management, including the creation of new and/or improved flood defences and water storage areas, provided they would not cause unacceptable adverse impacts and supporting the removal of existing culverted sections.'*

Policy A2: Bridlington Coastal Sub Area:

- *'Proactively manage the risk of flooding posed from the North Sea and the Gypsey Race catchment, including the risk of surface water and groundwater flooding, having regard to the relevant Strategic Flood Risk Assessment and flood risk management plans and strategies.*
- *Ensure the integrity of the Burton Agnes Haisthorpe and Mill Lane Ground Water Source Protection Zones are protected.*
- *Manage improvements to the Gypsey Race where it would create economic, environmental and recreational opportunities, and does not adversely affect conservation initiatives or the quality of the natural environment.'*

3.2 Selby District Core Strategy Local Plan (Adopted October 2013)

The Selby District Core Strategy Local Plan was adopted to replace the previous Local Plan; in place from 2005. The plan develops and underpins many of the aims and objectives of the Selby District Council (SDC). It provides a comprehensive land-use framework for promoting, coordinating and controlling future development.

Policy SP15 Sustainable Development and Climate Change:

> *'In preparing its site allocations and development management local plans, to achieve sustainable development, the council will:*
>
> *B – give preference to the re-use, best use and adaption of existing buildings and the use of previously developed land where this is sustainably located and provided that it is not of high environmental value;*
>
> *C – achieve the most efficient use of land without compromising the quality environment;*
>
> *D – ensure that development in areas of flood risk is avoided wherever possible through the application of the sequential test and exception test; and ensure that where development must be located within areas of flood risk that it can be made safe without increasing flood risk elsewhere; and*
>
> *E – support sustainable flood management measures such as water storage areas and schemes promoted through local surface water management plans to provide protection from flooding; and biodiversity and amenity improvements.'*

3.3 Selby District Council Local Plan Preferred Options Consultation 2021

The emerging Local Plan is a vision and framework for future growth of the district, identifying where new housing, employment and other development could take place.

A preferred approach with particular reference to flood risk is SG11 – Flood Risk:

- *'A – To enable communities to manage, be resilient and adapt to flood risk, the preferred approach is that development will only be supported where it can demonstrated that:*

  1. The proposal does not increase the risk of flooding off-site;

  3. The site falls within Flood Zone 1 or where the site falls within Flood Zone 3b, only essential or critical infrastructure that cannot be relocated and water compatible uses that do not impede the functional floodplain, or adversely affect the ability or access to flood defences, or which increase the risk of flooding elsewhere will be allowed; and

  4. The site has been passed through a Sequential Test as set out in the NPPF; or where necessary the Exception Test has been applied.

- *B the development is acceptable in principle in terms of flood risk the following will need to be applied where appropriate and practicable to design and layout of the scheme to make it acceptable in detail:*

  1. Where the development is located in Flood Zone 2/3 and does not constitute minor development or a change of use, the sequential approach will be applied;

  4. The development is designed to a flood event with a magnitude of a 1% AEP [annual exceedance probability] event (fluvial) or 0.5% AEP (tidal) event plus climate change allowance and in the event of a local drainage system failure;

5. The features that manage surface water make a positive contribution to reducing flood risk and that SuDS are incorporated with a management and maintenance plan for the lifetime of the development;

7. Floor levels are 300mm above the modelled 1% AEP (fluvial)/0.5% AEP (tidal) plus climate change allowances and/or 300mm above adjacent highway levels or alternative measures must be investigated where required; and

8. Hard surfaces on developments should be permeable where unless proven not to be possible by site investigation; watercourses are not culverted and any opportunity to remove culverts is taken.

- *D where required by the NPPF proposals for development should include an FRA with this demonstrating the development is safe for its lifetime, include access, without increasing flood risk elsewhere, and where possible, will reduce flood risk overall'.*

3.4 Ouse Catchment Flood Management Plan (December 2010)

A Catchment Flood Management Plan (CFMP) is a high-level strategic plan prepared by the Environment Agency, which identifies long-term (1:50 to 1:100 AEP) policies for sustainable flood risk within a catchment.

The relevant key messages contained within the Ouse CFMP (2010) are that:

- 95% of the CFMP area is agricultural with only 2.2% of land classed as urban;
- the main source of flooding is rivers with tidal influences on watercourses downstream of Naburn;
- groundwater was not mentioned as an issue within the catchments; and
- surface water drainage and sewers have the potential to affect urban areas with flooding recorded in large settlements such as York and Northallerton.

3.5 Hull and Coastal Streams Catchment Flood Management Plan (December 2010)

The relevant key messages contained within the Hull and Coastal Streams CFMP (2010) are that:

- settlements including Driffield and Market Weighton are listed as being at risk though they are included in the lowest band of risk with 100-500 properties at risk; and
- the sub-areas of the CFMP where the EOS passes through included policies designed to continue with existing or alternative actions to manage flood risk at the current level.

3.6 East Riding of Yorkshire Council Strategic Flood Risk Assessment Level 1 (2019)

The SFRA informs planning policies, assists in a realistic approach to managing risk of flooding, and is intended to provide a sufficient evidence base for the Local Development Plan. The purpose of this document is to collate and analyse the most up to date and readily available flood risk information for the study area for all sources of flooding including tidal flooding, flooding from rivers, surface water, groundwater, sewers and reservoirs and artificial sources. Main purposes of this SFRA are to:

- determine the variations in risk from all sources of flooding across the area, and the risks to and from surrounding areas in the same flood catchment;

- inform the sustainability appraisal of the Local Plan, so that flood risk is fully taken into account when considering allocation options and in the preparation of plan policies, including policies for flood risk management to ensure that flood risk is not increased;
- allow the application of the Sequential Test when determining land use allocations;
- identify the requirements for site-specific flood risk assessments in particular locations including those at risk from sources other than river and sea flooding;
- determine the acceptability of flood risk in relation to emergency planning capability; and
- consider opportunities to reduce flood risk to existing communities and developments through better management of surface water, provision for conveyance and of storage for flood water.

3.7 Selby District Council Level 1 Strategic Flood Risk Assessment (October 2020)

The main purposes of this SFRA are to:

- to take account of best practice, the latest guidance and the most up to date information;
- to assess the flood risk to and from the District from all sources, now and in the future, as well as outline how cumulative land use changes and development in the area will potentially impact flood risk;
- to be a robust piece of evidence to inform the preparation of the New Local Plan and the associated sustainability appraisal, so that flood risk is fully accounted for when considering allocation options and guides development to the safest areas;
- to inform the preparation of the emerging Local Plan policies;
- to inform the application of the Sequential Test and, if necessary, the Exception test;
- to identify requirements for site specific flood risk assessments;
- to assist in the determination of the acceptability of flood risk in relation to Selby's emergency planning capability; and
- to consider opportunities to reduce flood risk to existing communities and developments and recommend how the new Local Plan can best influence this issue.

3.8 Selby District Council Draft Level 2 Strategic Flood Risk Assessment (January 2021)

The Level 2 SFRA was published as draft in January 2021. It is not clear if the draft has been formally adopted and what weight should be applied to it at this time. However, the main purposes of this Level 2 SFRA are to provide more detailed flood risk information is support the application of the Sequential Test for sites identified for allocation in the Selby Local Plan. The document sets out the datasets used and goes on to provide 'site proformas' for each of the proposed allocation sites quantifying flood risk metrics such as percentage of site in each flood zone, 1% AEP fluvial flood depths, hazard, surface water flood risk and site specific recommendations for each of the sites.

Notably the proposed allocation sites within the Level 2 SFRA does not include the EOS cable route or the converter station at Drax Power Station.

3.9 East Riding of Yorkshire Council Local Flood Risk Management Strategy 2015-2027 (2015)

A Local Flood Risk Management Strategy (LFRMS) is required to be produced by all Lead Local Flood Authorities (LLFAs) to set out how local flood risks will be managed in the county, who will deliver them and how they will be funded. This document was adopted in 2017 and covers the period from 2016-2020.

It is the LLFA's responsibility to manage the risks associated with flooding from the following sources: surface water, groundwater and ordinary watercourses.

Based on national assessments of present day risk, the East Riding is ranked within the top ten areas in the country with the highest number of homes in areas at risk of river and tidal flooding. The level of flood risk is expected to increase in the future due to climate change with greater quantities of rainfall and rises in sea level.

3.10 East Riding of Yorkshire Council Preliminary Flood Risk Assessment (2011)

This document seeks to provide an initial assessment of local flood risk across the East Riding, including information on past floods and the potential for future flooding. Objectives for this report:

- establish boundaries of the indicative flood risk area;
- identify additional hydraulic catchment-based flood risk areas to be subject to further studies (such as surface water management plans);
- record historic flood events from local and national sources and to assess the consequences and impacts of these;
- assess potential future flood events and their impacts;
- feed into flood resilience and emergency planning processes;
- provide the context and framework for a local flood risk management strategy that will identify priorities, investment and resource requirements.

3.11 North Yorkshire County Council Local Flood Risk Management Strategy (2014)

As Lead Local Flood Authority (LLFA) North Yorkshire County Council is responsible for producing a Local Flood Risk Management Strategy to set out how local flood risks will be managed in the county, who will deliver them and how they will be funded.

The LFRMS states that in middle and lower parts of catchment areas (including Selby), several large watercourses exist and types of flooding experienced can be varied with complex interactions between different flood sources. Longer response times in the middle and lower parts of the catchments enable earlier and more accurate forecasting of flood risk in this part of the County. However, the high river levels over these longer durations can lead to a complex array of other flooding issues in surrounding local drainage systems. These areas also tend to be more populous, and the extended duration of raised water levels tends to lead to much greater levels of loss and damage to property.

3.12 Humber River Basin Management Plan (2015)

The purpose of a River Basin Management Plan (RBMP) is to provide a framework for protecting and enhancing the benefits provided by the water environment. To achieve this, and because water and

land resources are closely linked, it also informs decisions on land-use planning. This plan contains four sets of information that groups who manage land and water should pay particular attention to:

- baseline classification of water bodies - One of the main purposes of this plan is to prevent water bodies deteriorating. The first step to preventing deterioration is to understand the baseline status for all the quality elements in each water body. Deterioration from the baseline is not permitted, except in very specific circumstances that are described in this plan. Preventing deterioration is one of the biggest challenges in managing the water environment;
- statutory objectives for protected areas - This plan highlights the areas of land and bodies of water that have specific uses that need special protection. These include waters used for drinking water, bathing, commercial shellfish harvesting and those that sustain the most precious wildlife species and habitats. The plan ensures that these areas have the legally binding objectives in place that protect those uses from potentially harmful activities and new developments;
- statutory objectives for water bodies - This plan sets out legally binding objectives for each quality element in every water body, including an objective for the water body as a whole. The default objective is good status. Less stringent objectives have been set in some cases where natural conditions, technical feasibility or disproportionate cost make improvement impractical. The default deadline for achieving objectives is 2021. However, extended deadlines of 2027 or beyond have been set in some cases where it would be more appropriate, have less impact on existing activities or where the environment will need more time to respond to the planned measures; and
- summary programme of measures to achieve statutory objectives - This plan provides a framework for action and future regulation. To do this it summarises the existing mechanisms, both statutory and voluntary, that are used to manage the quality of the water environment. It also summarises the types of action and who needs to do this, to achieve the statutory objectives. Although it is not a detailed action plan it provides a clear signal to those who use and affect water about what they can do to make sure there is enough good quality water for life and livelihoods in England.

4. English Onshore Scheme

4.1 Scheme Location and Description

The EOS consists of an underground HVDC cable from Fraisthorpe (TA 16904 63447) to a converter station located next to the Drax Power Station (SE 67133 27138). The EOS also includes the construction of a new converter station near the existing Drax power station, as well as several temporary construction compounds, and other temporary features such as horizontal directional drilling (HDD) pits and joint bays along the EOS route. EOS also includes other components such as temporary haul roads, temporary accesses and bellmouths and permanent accesses. The FRA only considers the converter station, temporary construction compounds, temporary HDD pit locations and temporary joint bays as being of relevance. The total cable route of the EOS is approximately 69 km with further details on the route included in the following paragraphs. See Figure 1, Figure 2 and Figure 3 for the location of the proposed EOS.

Due to the length of the EOS, the scheme has been subdivided into four sections to facilitate a clearer assessment of flood risk. These are:

- Route section 1 – Landfall to Bainton;
- Route section 2 – Bainton to Market Weighton;
- Route section 3 – Market Weighton to River Ouse; and
- Route Route section 4 – River Ouse to Drax Substation.

Route section 1 of the EOS mainly avoids urban/developed areas with the EOS passing close to Wansford, Skerne and Hutton Cranswick. The route section crosses major roads and railways including the A164 and Yorkshire Coast Line near Hutton Cranswick, the B1249 near Wansford and the A165 south of Bridlington.

Route section 2 passes through primarily rural areas with the EOS passing close to the south of Market Weighton. This route section does cross major roads including the A1034 and A1079 near Market Weighton and the B1428 near Bainton.

Route section 3 is also mainly within rural areas with the EOS passing close to the settlements of Asselby, Brind and Newsholme. This route section of the EOS crosses major roads and railway infrastructure including the A63 near Newsholme, the Hull Line railway located near Howden and the A614 south of Holme-on-Spalding-Moor.

Route section 4 covers a relatively short distance when compared to the previous three route sections with the EOS passing close to the village of Drax, includes the proposed converter station to the immediate east of New Road and ultimately finishing at the existing Drax substation at Drax power station.

Several temporary construction compounds are proposed to be built along the EOS. These are for the storage of material and plant during the construction phase of the EOS cable route and crossings. Cable installation across all Environment Agency operated/maintained waterways and selected others following stakeholder engagement and environmental and technical review will be undertaken by HDD or open cut approaches. A schedule of crossings will be included in the Environmental Impact Assessment as Appendix 3-A that identifies each crossing as either committed HDD, HDD unless otherwise agreed, or open cut. .A temporary haul road will be maintained along the majority of the cable route to allow for continuous access for construction logistics. The haul road will cross watercourses as part of a clear span bridge structure, such as a Bailey bridge (or equivalent), or a culverted option on smaller watercourses and drains These bridge structures have an expected lifespan of 3 years after which they will be decommissioned.

There are a number of proposed temporary construction compounds, temporary HDD entry/exit pits and temporary joint bays included in the EOS. Other components of the EOS such as temporary haul roads, temporary and permanent accesses and bellmouths have not been considered in this FRA. The numbers of relevant EOS components in each Route Section are summarised below. It should be noted that the design, including numbers and locations of components is subject to finalisation after the appointment of a contractor. The number of HDD pits listed below include those crossings which are considered to be HDD unless otherwise agreed to be open cut.

- Route section 1 – eight compounds, 44 HDD pits; 25 joint bays;
- Route section 2 – four compounds, eight HDD pits; 17 joint bays;
- Route section 3 – five compounds, 29 HDD pits; 26 joint bays; and
- Route section 4 – two compounds, five HDD pits; one joint bay.

Figure 1: English Onshore Scheme Alignment (Sheet 1 of 3)

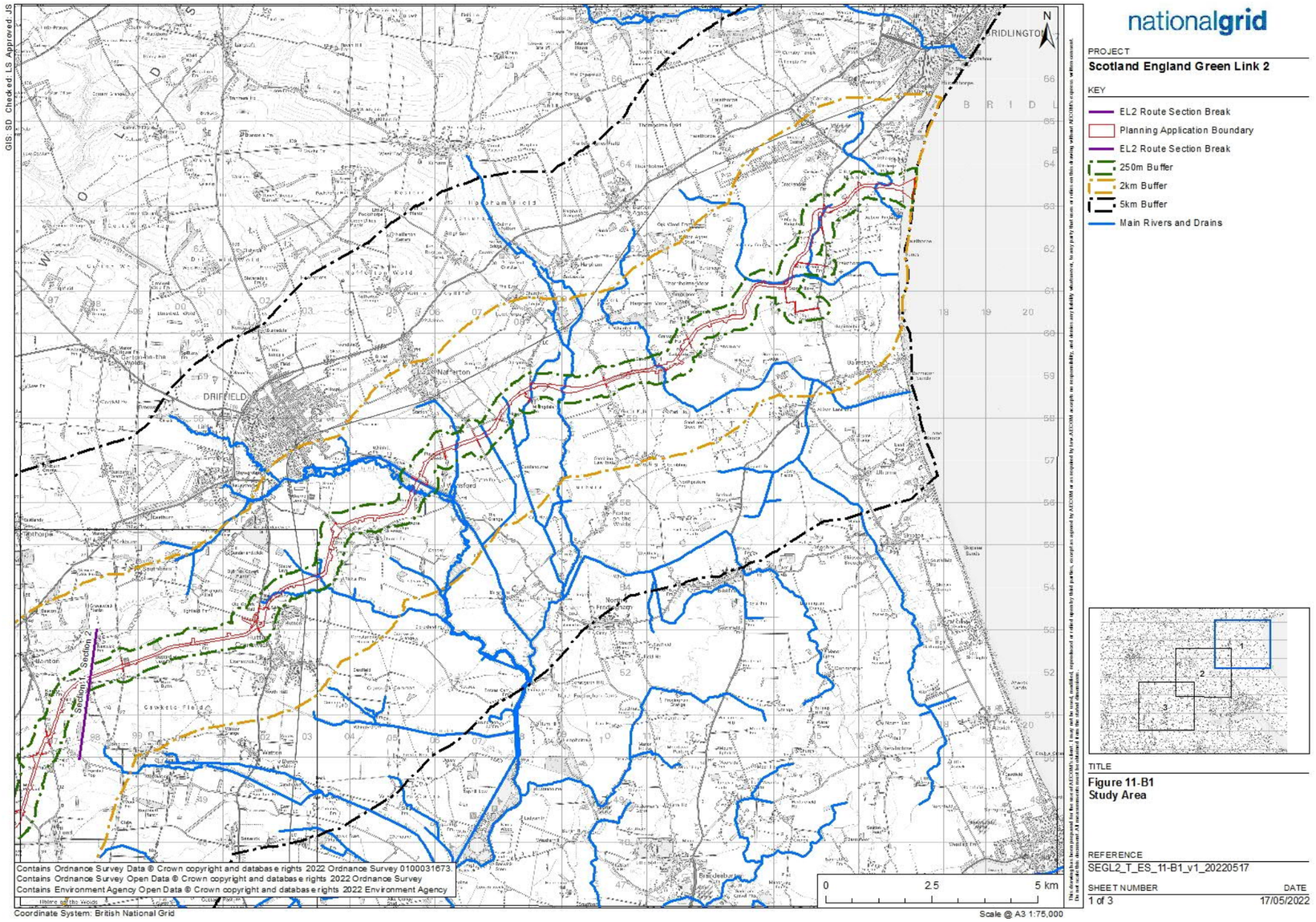
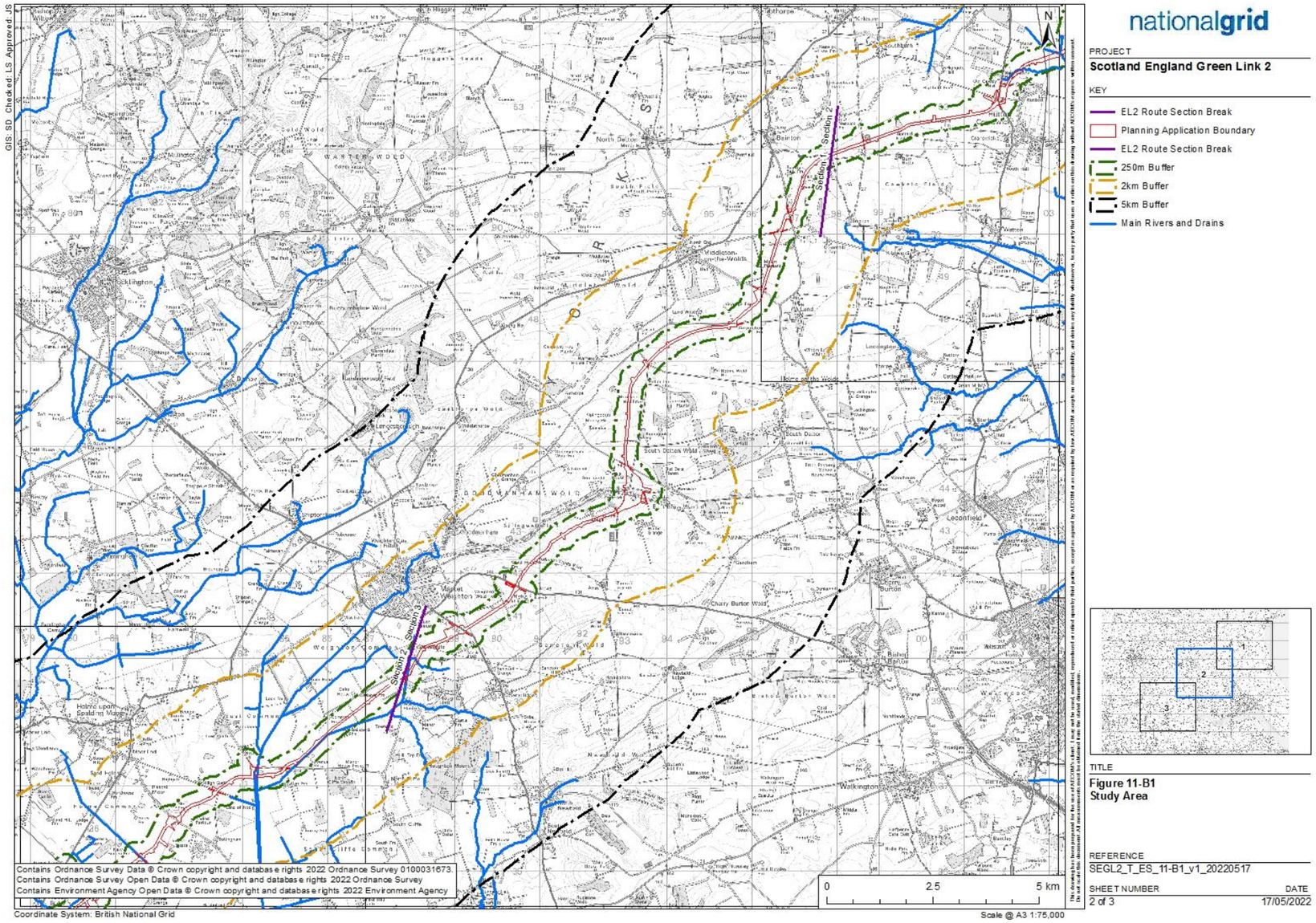


Figure 2: English Onshore Scheme Alignment (Sheet 2 of 3)



nationalgrid

PROJECT
Scotland England Green Link 2

KEY
- EL2 Route Section Break
- Planning Application Boundary
- EL2 Route Section Break
- 250m Buffer
- 2km Buffer
- 5km Buffer
- Main Rivers and Drains

TITLE
Figure 11-B1
Study Area

REFERENCE
SEGL2_T_ES_11-B1_v1_20220517

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2 of 3

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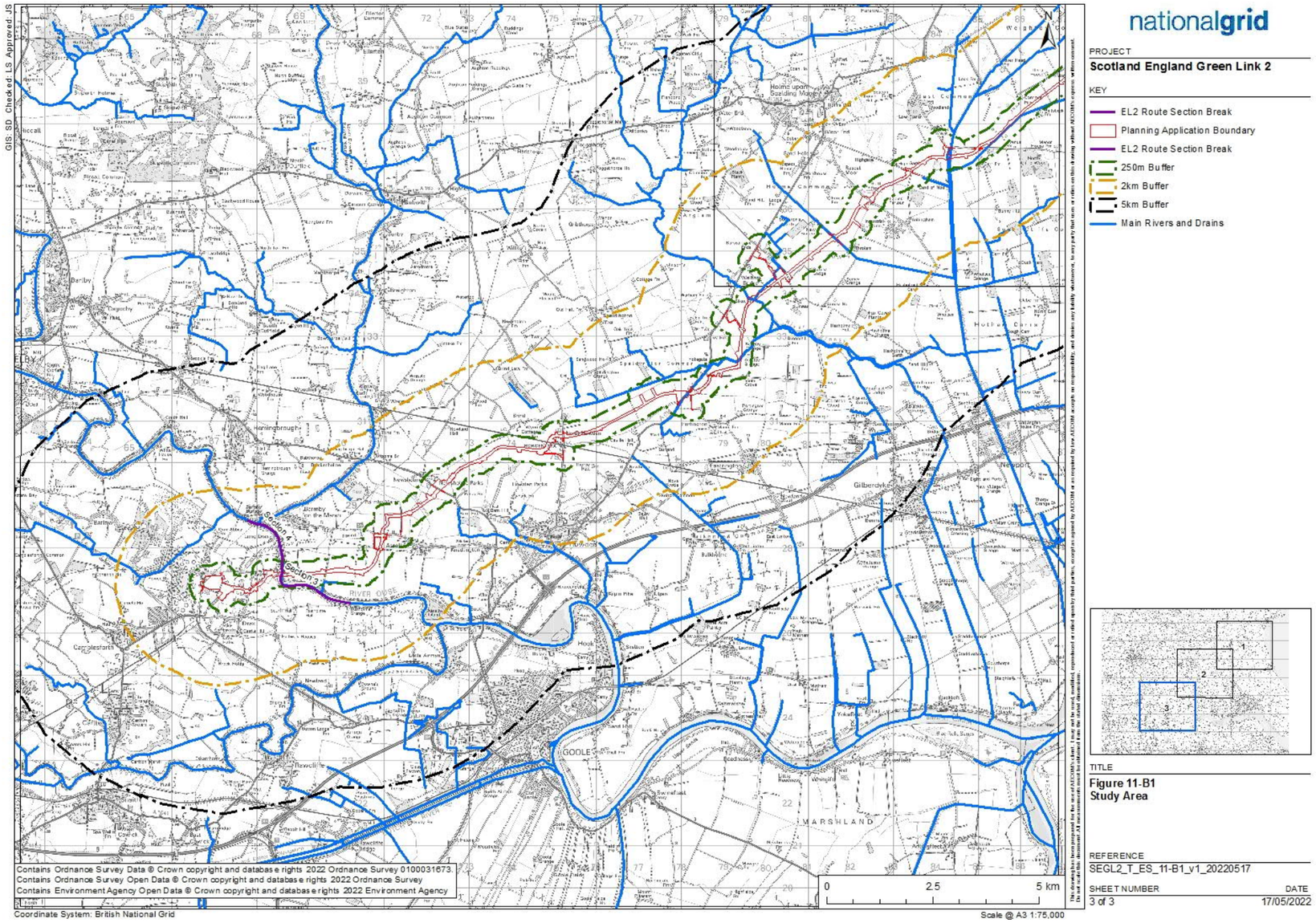
17/05/2022

Figure 3: English Onshore Scheme Alignment (Sheet 3 of 3)



4.2 Topographic Survey and Scheme Levels

Due to the total length of the EOS, ground levels have been assessed using Light Detection and Ranging (LIDAR) data along the EOS. Ground levels in the area of the proposed converter station, taken from a 2020 1 m resolution digital terrain model (DTM) have a range of 3.04-5.35 mAOD with the average being 3.93 mAOD.

Detailed design levels for the EOS and individual areas including construction compounds, converter station and bridge crossings are to be confirmed and supplied in the final design details.

4.3 Local Geology

The British Geological Society (BGS) 1:50,000 Geology of Britain Viewer indicates the underlying strata for the following route sections:

- Route section 1 – underlain by chalk bedrock and superficial deposits of glacial till meaning this section is permeable to both infiltration and groundwater;
- Route section 2 – mapping shows this area to have largely the same geology as identified in Route section 1 ;
- Route section 3 – underlain by mudstone, siltstone and sandstone with superficial deposits of clay meaning this area is impermeable to both infiltration and groundwater; and
- Route section 4 – underlain by sandstone bedrock and superficial deposits of clay and silt meaning this route section is somewhat impermeable to both infiltration and groundwater.

The Cranfield Institute Soilscapes mapping for each individual route section identified:

- Route section 1 – mostly slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils that have impeded drainage the closer to Bainton;
- Route section 2 – slightly acid loamy and clayey soils with impeded drainage becoming freely draining lime-rich nearing Market Weighton;
- Route section 3 – soils that are naturally wet very acid sandy and loamy soils with high water tables and naturally high groundwater which becomes more base-rich loamy and clayey and naturally high groundwater the further west most likely due to the close proximity to large watercourses such as the River Ouse and Foulness; and
- Route section 4 – the predominant soil profile is shown to be slowly permeable clay-based soils.

4.4 Flood Zone

The EOS crosses multiple features:

- Route section 1 – 44 watercourses including five classified as Main River;
- Route section 2 – five watercourses all classified as ordinary watercourses;
- Route section 3 – 46 watercourses including two classified as Main River; and
- Route section 4 – 11 watercourses including one classified as Main River.

Table 1: Flood Zone Terminology

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability (0.1% AEP) of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Flood Zones 2 and 3).
Zone 2 Medium Probability	Land having between a 1 in 100 (1% AEP) and 1 in 1,000 (0.1% AEP) annual probability of river flooding; or

Flood Zone	Definition
	Land having between a 1 in 200 (0.5% AEP) and 1 in 1,000 (0.1% AEP) annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 (1% AEP) or greater annual probability of river flooding; or Land having a 1 in 200 (0.5% AEP) or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Flood Zone 3a on the Flood Map)

Figures 4, 5 and 6 show the flood map for planning Flood Zones at the time of publication.

4.5 Climate Change

The 'Flood risk assessments: climate change allowances' (May 2022) guidance (Ref 27) outlines the allowances that are to be made for climate change when undertaking any form of flood risk assessment. This ensures that vulnerability of the development is minimised and that it is resilient to flooding and coastal change in the future.

The vulnerability classification of the development and flood zone in which the development is located are used to decide which allowances are used. For developments in Flood Zone 1, it is recommended that consideration be given as to whether these locations may in future be in Flood Zone 2 or 3. The climate change allowances, outlined in Table 5.1 of the above guidance, are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise and offshore wind speed and extreme wave height. **Table 2** and **Table 3** provide details on the climate change allowances for fluvial, pluvial and tidal sources in both the Hull and East Riding and Wharfe and Lower Ouse Management Catchment.

Table 2: Fluvial and Pluvial Climate Change Risk

Parameter	Allowance Category	2015 to 2039	2040 to 2069	2070 to 2115
Peak River Flow (Hull and East Riding)	**Upper End**	33%	37%	66%
	Higher Central	15%	17%	33%
	Central	9%	9%	20%
Peak River Flow (Wharfe and Lower Ouse)	**Upper End**	22%	29%	48%
	Higher Central	14%	18%	31%
	Central	11%	13%	23%
Peak Rainfall Intensity (Hull and East Riding)	**Upper End 3.3% AEP**	-	35%	35%
	Central 3.3% AEP	-	20%	25%
	Upper End 1% AEP	-	40%	40%
	Central 1% AEP	-	20%	25%
Peak Rainfall Intensity (Wharfe and Lower Ouse)	**Upper End 3.3% AEP**	-	35%	40%
	Central 3.3% AEP	-	20%	25%
	Upper End 1% AEP	-	40%	40%
	Central 1% AEP	-	25%	30%

Table 3: Fluvial and Pluvial Climate Change Risk

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Humber	**High Central**	5.5 (193)	8.4 (252)	11.1 (333)	12.4 (372)	1.15
	Upper End	6.7 (235)	11 (330)	15.3 (459)	17.6 (528)	1.55

Latest guidance on allowances for sea level rise supplied by the Environment Agency indicates that allowances of 0.89 m (higher central/70th percentile) and 1.25 m (upper end/95th percentile) should be applied to the future planning of the EOS due to its location in the Northumbria River Basin District. These values represent a cumulative rise in sea level from 2021-2121.

4.6 Vulnerability Classification

As stated in the NPPF 2021 guidance a sequential risk based approach should be applied to the location of new developments. The sequential test should be used to steer development to areas with the lowest risk of flooding. If it is not possible for development to be steered to areas of lower flood risk, the Exception Test may need to be applied depending on the vulnerability of the development and the level of flood risk. For the Exception Test to be passed it must be demonstrated that;

- The development would provide sustainability benefits to the community that outweigh flood risk and;
- The development will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere and where possible will reduce flood risk overall.

The EOS falls under the classification of 'Essential Infrastructure' land use based on Table 2 of the PPG Technical Guidance. Table 3: Flood Risk Vulnerability and Flood Zone Compatibility in PPG, states that this land use is appropriate in Flood Zone 1 and 2, and subject to the Exception Test in Flood Zone 3a and 3b. The EOS essential utility infrastructure which has to be located in a flood risk area for operational reasons, and it comprises infrastructure for electricity supply which is identified in Annex 3 of the NPPF as essential infrastructure.

The Environmental Statement and the Planning Statement demonstrate why it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives and the objectives of the Project). Therefore, Paragraphs 163 and 164 of the NPPF apply to the EOS.

Table 4: Flood Zone Risk and Vulnerability

Flood Zones	Flood Risk Vulnerability				
	Essential infrastructure	**Highly vulnerable**	**More vulnerable**	**Less vulnerable**	**Water compatible**
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	✗	Exception Test required	✓	✓

Zone 3b	Exception Test required	✗	✗	✗	✓

Key: ✓Development is appropriate ✗Development should not be permitted

As the development is for a large linear infrastructure project connecting to a specific end point then there are limited opportunities to apply the Sequential test in the way it is intended. However in deriving the development corridor a sequential approach has been applied to corridor mapping to avoid flood risk where possible and reduce temporary and permanent infrastructure withing the Flood Zones where possible. It has been demonstrated that no other viable alternative route options are available at less flood risk than the option promoted.

The EOS is, by virtue of being funded under OFGEM regulations has been shown to be necessary investment that provides substantial benefits. The EOS is an important part of SEGL2 which will enhance the transmission network and provide increased network capability supporting increased renewable energy generation in line with UK and Scottish Government net zero targets. Community benefits associated with the EOS are reported elsewhere but include the creation employment opportunities associated with both the construction phase of the scheme and permanent elements of the scheme in the operational phase. These benefits outweigh the flood risk to the EOS as outlined within this report. Additionally the report shows that the development can be kept safe for its lifetime without measurably increasing flood risk elsewhere.

5. Sources of Flooding

5.1 Fluvial Flood Risk

Fluvial flood events occur when the water level in a river, lake or stream rises and overflows onto the surrounding banks, shores and neighbouring land. The rise in water level is typically caused by excessive rainfall, with the severity of fluvial flooding being determined by the duration and intensity (volume) of rainfall in the river catchment area.

The Environment Agency's Flood Map for Planning indicates the parts of the EOS are located in Flood Zones 1, 2 and 3 from fluvial sources. The following paragraphs provide further details on each route section. See Figure 4, Figure 5 and Figure 6 for the Flood Zone maps.

Route section 1 – Landfall to Bainton

Route section 1 of the EOS is within areas of Flood Zone 2 and 3 from fluvially dominant sources at 13 different locations according to the Environment Agency Flood Map for Planning and the ERYC SFRA. Fluvial risk is concentrated along watercourses that the EOS crosses. In particular this includes West Beck, River Hull and other ordinary watercourses southwest of Driffield, Gransmore Drain and Kell Beck near Lowthorpe and ordinary watercourses west of Fraisthorpe.

Modelled flood extents from the Environment Agency's River Hull and Holderness Drain Flood Mapping Study (2013) are shown to cover the planning boundary area and route sections the proposed EOS cable route. The model includes both defended and undefended outputs as well as incorporating fluvial and tidal risk. In this route section fluvial is considered the primary risk.

In the defended modelled scenario 50% AEP event no flooding is shown to occur. The 5% AEP event shows land between the River Hull and Main Drain inundated coinciding with the cable route, though flood extents are primarily focused to the west of the EOS proposed cable route. Flood extents in the 1% AEP event were modelled to be largely the same extent of risk as with the 5% AEP event. Flooding extends to include land east of the cable route in the 0.1% AEP event.

In the undefended scenario, modelled flood extents cover largely the same areas though to a lesser extent than the defended outlines. This is most notable in the 0.1% AEP event where flooding only extends onto land west of the EOS proposed cable route and not to the east, between the Main Drain, River Hull and the Driffield Canal .

Flood depths and hazard output grids are not available to be supplied for this route section as they were only produced for surrounding areas located in Northern Hull and Beverley.

There are eight temporary proposed construction compounds, 22 temporary HDDs, both committed and potential to open cut watercourses (44 HDD pits) and 25 temporary joint bays within this route section.

All of the proposed construction compound locations are outside established flood zones and so are not at risk of fluvial flooding.

Four of the confirmed HDD pit locations are shown to be partially within areas of Flood Zone 3. These are; the exit pits of HDD 14,15 and both the entry and exit pits of HDD 21. Two HDD pit locations overlap Flood Zone 2, the entry pits of HDD 12 and HDD 14.

Two of the HDD pit locations with the potential to open cut watercourses are shown partially within Flood Zone 3; the entry pit of HDD 3 and the exit pit of HDD 4. Three pit locations are in Flood Zone 2; the entry and exit pits of HDD 1, and the entry pit of HDD 4

One of the proposed temporary joint bays within route section 1 is located within Flood Zone 3.

Route section 1 of the EOS is located within the extents of three Flood Alert Areas (FAA) and one Flood Warning Area (FWA).

Route section 2 – Bainton to Market Weighton

This route section of the EOS does not intersect with the extents of Flood Zone 2 and 3; derived from fluvially dominant sources other than within the narrow floodplains of Bracken Beck located south of Bainton and Bells Beck south of Market Weighton.

None of the temporary construction compounds, temporary HDD pits or temporary joint bays are located in flood risk areas.

This route section is within the extent of one FAA but no FWAs.

Route section 3 – Market Weighton to River Ouse

Route section 3 of the EOS is within Flood Zone 2 and 3 from fluvially dominant sources in three main areas. The first is located south of Market Weighton on the Market Weighton Canal, East Ings Drain and Bells Beck. The second is within Flood Zone 2 only along Fleet Drain, a tributary of the River Derwent north of Wressle. The third area is focused around New Drain, northwest of Howden.

Modelled flood extents from the Mill Dike (Market Weighton) Environment Agency Flood Mapping Study (2007) show flooding in the direct impact area in the 10% AEP event up to the 0.1% AEP event, with flooding focussed on a section of the Market Weighton Canal near Sand Lane (SE 84346 37439). Flooding extends west from the canal to floodplain near Cliffe Lane. In all modelled events, the areas of greatest depths are located within the channel with depths on the floodplain between 0.9-1 m in the 10% AEP event, 0.8-1 m in the 1% AEP event and 1.1-1.2 m in the 0.1% AEP event.

The 2013 Upper Humber study modelled extents cover areas of route section 3 near the River Ouse, extending across the floodplain in this location. The model was re-run in 2021 to produce updated results as well as to incorporate the latest climate change allowances. The defended 1% AEP +CC event flood extents cover the proposed cable route and extend across the direct impact area. Flood extents remain south of both Barmby on the Marsh and Asselby. Flood depths in this event are between 0.48-2.23 m around the proposed cable route.

The flood extents for all modelled events do not extend further south than Sand Lane due to the limit of the modelled area rather than a lack of flood risk to this land. The Flood Map for Planning shows the cable route south of Sand Lane is located within Flood Zone 3.

This route section of the scheme is within areas of joint fluvial and tidal sources shown as Flood Zone 2 being located along the River Foulness near Welham Bridge and along New Drain near Howden.

One of the construction compounds; compound 14 is located within fluvial Flood Zone 2.

One of the confirmed HDD pit locations is within fluvial Flood Zone 3; the exit pit of HDD 36, additionally the entry pit of HDD 41 is in Flood Zone 3 from joint fluvial and tidal sources. Two HDD pit locations are within fluvial Flood Zone 2; both the entry and exit pits of HDD 34.

Three HDD pit locations with the potential to open cut watercourse are located in fluvial Flood Zone 3; the exit pit of HDD 35 and both the entry and exit pits of HDD 37. Additionally, four pit locations are located in Flood Zone 3 from joint fluvial and tidal sources, the entry and exit pits of HDD 39 and HDD 40. Four pit locations are in fluvial Flood Zone 2; the exit pit of HDD 28, both the entry and exit pits of HDD 33 and the entry pit of HDD 35.

One of the proposed temporary joint bays within route section 3 is located within fluvial Flood Zone 3 with another three located in Flood Zone 3 from joint fluvial and tidal sources. Three proposed joint bays are located within fluvial Flood Zone 2 and one within Flood Zone 2 from joint fluvial and tidal sources.

Route section 3 of the EOS is within the extent of three FAAs and one FWA.

Route section 4 – River Ouse to Drax Substation

All of this route section of the EOS is within extents of both Flood Zone 2 and 3 from fluvially dominant sources and combined fluvial tidal events. These locations are focused on the River Ouse and from ordinary watercourses in the west of this route section.

The updated model results from the 2013 Upper Humber study show flooding across almost the entirety of route section 4 including the proposed converter station site which is completely inundated in a 1% AEP +39%CC event. Flood outlines extend across the floodplain from the River Ouse and end in the west along New Road. Depths in this route section are on average 0.62 m within the proposed converter station site.

The 0.1% AEP fluvial event effectively extends across the same area as the 1% AEP +39%CC event.

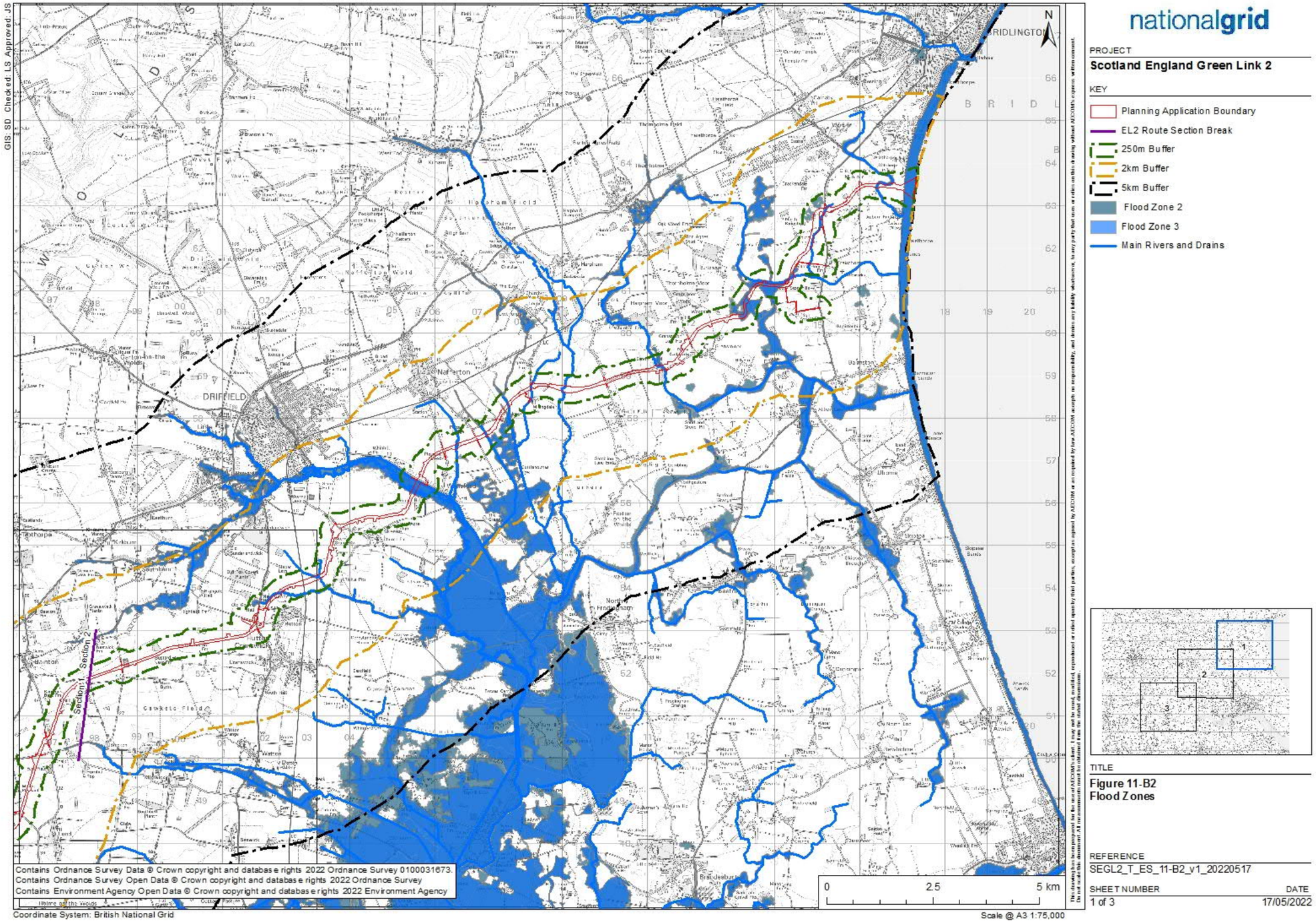
Both of the construction compounds; compounds 18 and 19 are located within Flood Zone 3 from joint fluvial and tidal sources.

Three of the confirmed HDD pit locations are located within Flood Zone 3 from joint fluvial and tidal sources, the exit pit of HDD 41 and both the entry and exit pits of HDD 43. Both pit locations of HDD 42 with potential to open cut watercourses are also located in Flood Zone 3 from joint fluvial and tidal sources.

The single proposed joint bay within route section 4 is located within Flood Zone 3 and 2 from fluvial and tidal sources.

Route section 4 is within the extents of two FAAs and one FWA.

Figure 4: Environment Agency Flood Map for Planning (Sheet 1 of 3)



nationalgrid

PROJECT
Scotland England Green Link 2

KEY
- Planning Application Boundary
- EL2 Route Section Break
- 250m Buffer
- 2km Buffer
- 5km Buffer
- Flood Zone 2
- Flood Zone 3
- Main Rivers and Drains

TITLE
Figure 11-B2
Flood Zones

REFERENCE
SEGL2_T_ES_11-B2_v1_20220517

SHEET NUMBER
1 of 3

DATE
17/05/2022

Figure 5: Environment Agency Flood Map for Planning (Sheet 2 of 3)

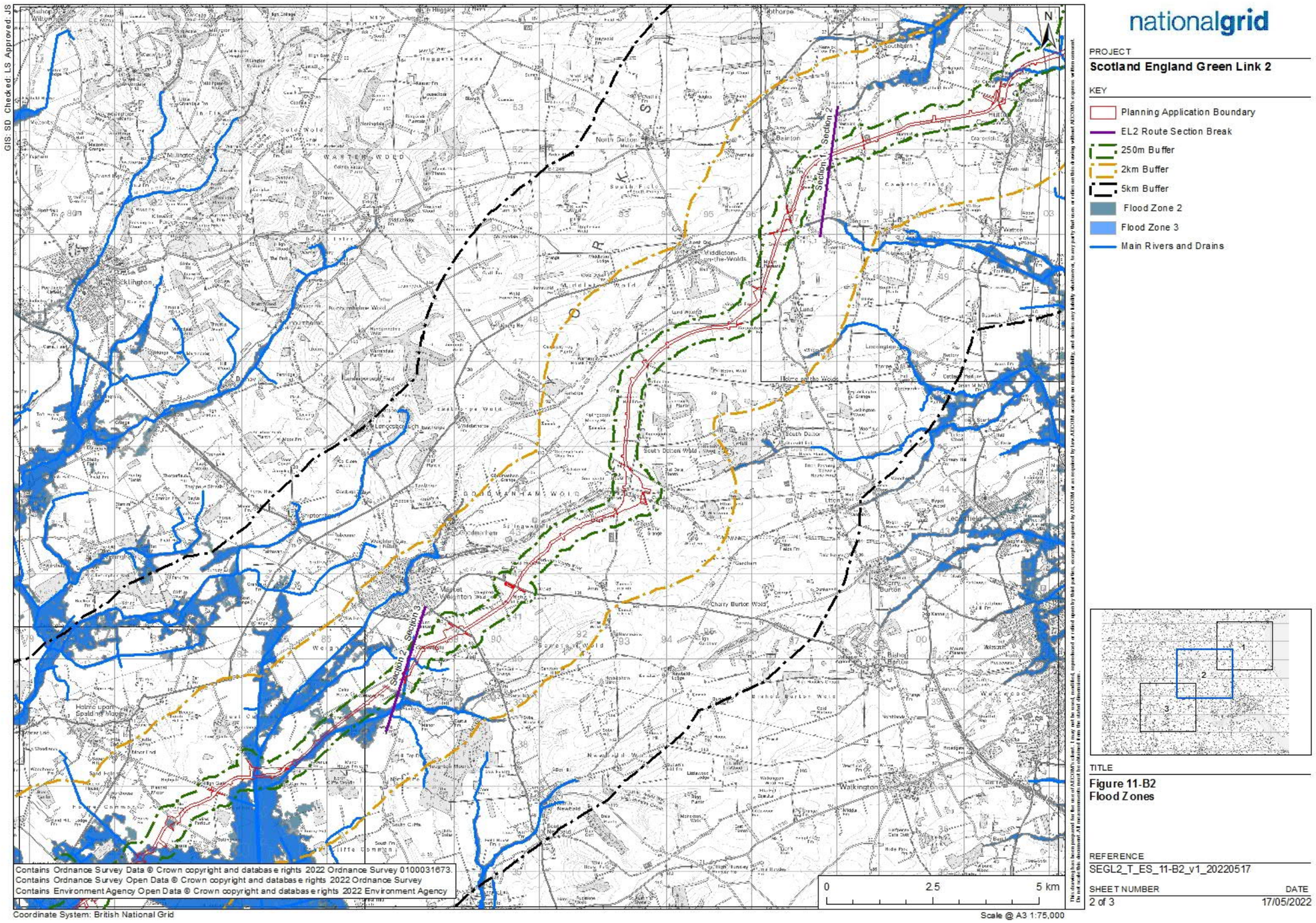
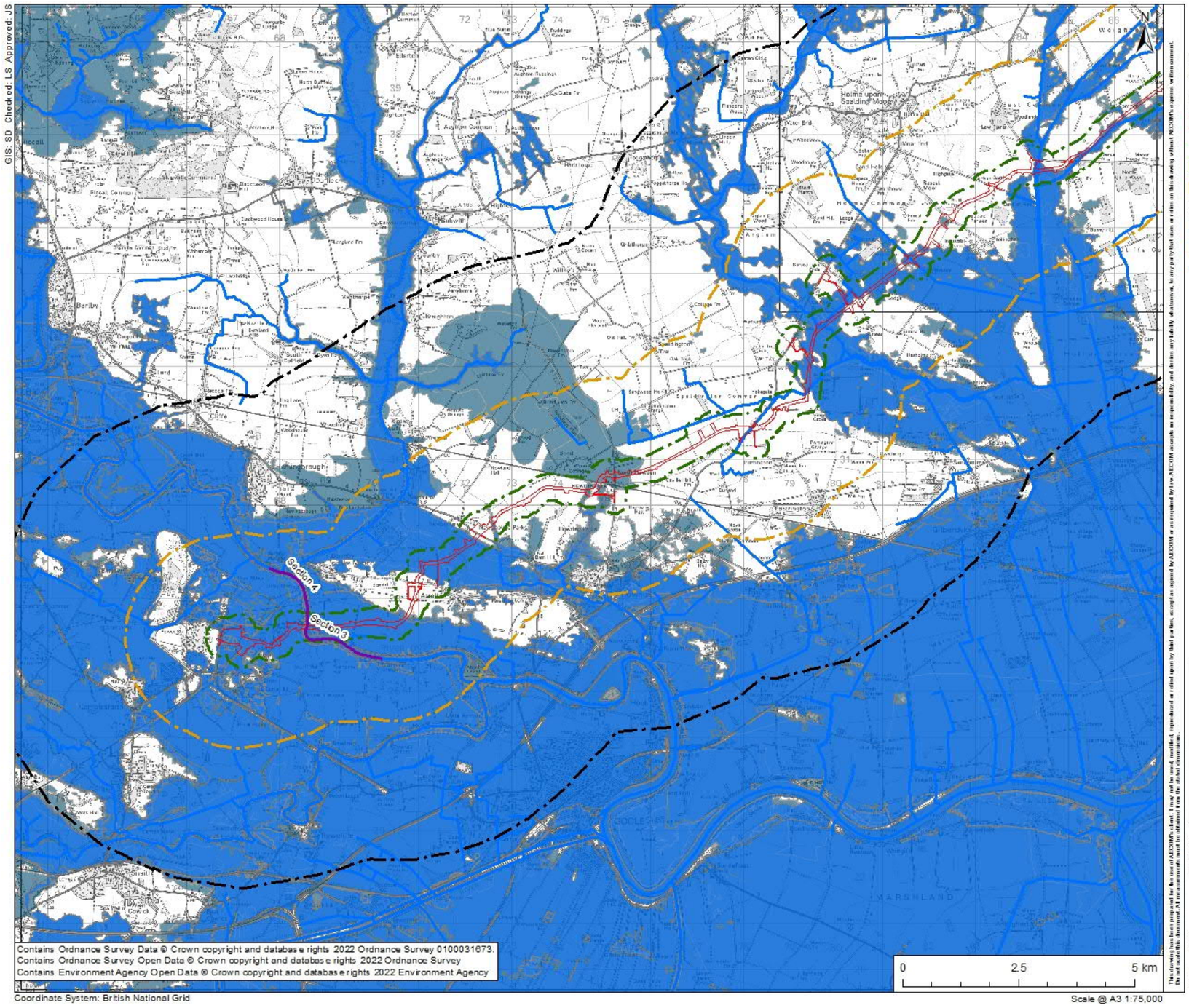


Figure 6: Environment Agency Flood Map for Planning (Sheet 3 of 3)



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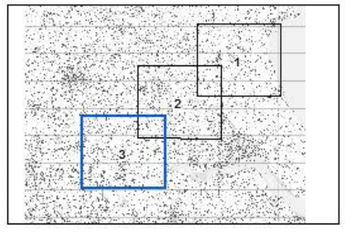

TITLE
Figure 11-B2
Flood Zones

REFERENCE
SEGL2_T_ES_11-B2_v1_20220517

SHEET NUMBER
3 of 3

DATE
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5.2 Tidal Flood Risk

Tidal flooding occurs when a high astronomical tide exceeds the level of coastal land or coastal flood defences. Tidal flooding can also be caused as a result of 'tide locking' rivers or estuaries. Tide locking prevents a river from discharging into the sea, causing 'backing up' and resulting in tidal/fluvial flooding.

The Environment Agency's Flood Map for Planning indicates that parts of the EOS are located in Flood Zones 1, 2 and 3 from tidal sources. The following paragraphs provide further details on each route section.

Route section 1 – Landfall to Bainton

This route section of the EOS is within extents of both Flood Zone 2 and 3 from tidally dominant sources. This is concentrated at the eastern end of route section 1 with tidal risk focused on the shoreline, though outside the extent of the EOS landfall location, and along Burton Drain, north of Lisset.

The landfall location, and associated temporary construction compounds, temporary HDD pit and temporary joint bays are not shown to be within the areas of tidal Flood Zone 2 or 3.

Route section 2 – Bainton to Market Weighton

Route section 2 of the EOS is not within extents of Flood Zone 2 or 3 from tidally dominant sources.

Route section 3 – Market Weighton to River Ouse

Parts of this route section of the EOS are within areas of both Flood Zone 2 and 3 from tidally dominant sources mostly in the centre of this route section around the River Foulness, east of Spaldington.

One construction compound, compound 13, is partially within Flood Zone 3 from tidally dominant sources.

Four of the confirmed HDD pits are within Flood Zone 3 from tidally dominant sources: the exit pit of HDD 27, the entry and exit pits of HDD 30 and the entry pit of HDD 31. Additionally the entry pit of HDD 41 is in Flood Zone 3 from joint fluvial and tidal sources. One pit location, the entry pit of HDD 27 is within Flood Zone 2 from tidally dominant sources.

Two pit locations of HDD pits with the potential to open cut watercourses are within Flood Zone 3 from tidally dominant sources; the entry and exit pits of HDD 29. Additionally, four pit locations are located in Flood Zone 3 from joint fluvial and tidal sources, the entry and exit pits of HDD 39 and HDD 40.

Portions of the proposed EOS are within the 1% AEP event tidal scenario modelled flood extents from the 2013 Upper Humber Flood Risk Study. These portions are focused near the River Ouse, south of Barmby on the Marsh and extend over the proposed location of the HDD crossing on this bank. Depths of flooding in the 1% AEP modelled event are between 0.01-0.38 m along the proposed EOS route.

The EOS is also within the joint fluvial-tidal scenario 1% AEP event extent which extends slightly further along the floodplain between Barmby on the Marsh and the River Ouse with flood depths between 0.03-0.54 m.

The updated 0.5% +CC AEP event extends across a similar location to previously discussed events in route section 3 with flood outlines reaching western sections of Barmby on the Marsh whilst still remaining south of Asselby. Flood depths in this event are between 1.57-3.78 m.

In the 0.1% AEP tidal event, flood extents are shown to not extend as far north as the 0.5% +CC AEP event and inundate the floodplain to the south of Barmby on the Marsh and Asselby. Flood depths are between 0.02-1.64 m along the EOS though depths around the entry pit of HDD 41 are at the lower end of the range being 0.05-0.09 m.

Route section 4 – River Ouse to Drax Substation

Route section 4 of the EOS is not within either Flood Zone 2 or 3 from solely tidal dominant sources but is within Flood Zones of joint fluvial and tidal sources.

Both construction compounds; 18 and 19 are within Flood Zone 3 from joint fluvial and tidal sources.

Three of the confirmed HDD pit locations are located within Flood Zone 3 from joint fluvial and tidal sources, the exit pit of HDD 41 and both the entry and exit pits of HDD 43. Both pit locations of HDD 42 with potential to open cut watercourses are also located in Flood Zone 3 from joint fluvial and tidal sources.

The EOS crosses the 1% AEP tidally dominated scenario flood extent from the Upper Humber study, but the proposed cable route and proposed converter station are not located within the flood extent. Flooding is limited to alongside the River Ouse to the north of the EOS with depths between 0.03-0.54 m.

The proposed cable route and converter station are located outside of the 1% AEP combined fluvial/tidal scenario extent from the Upper Humber study which has a similar outline to the tidal scenario. Within EOS working width, modelled depths for this scenario are between 0.01-0.84 m.

The 0.5% +CC AEP event extent covers approximately 50% of route section 4 focused on areas closer to the River Ouse with eastern sections of the existing power station area, and land near Drax outside of the flood extent. Depths in this event across route section 4 are between 0.04-1.95 m. The northern areas of the proposed converter station location are shown to be inundated whilst the southern areas are shown to remain mostly outside flood extents.

The 0.1% AEP tidally dominated scenario flood extents inundate land to the north of proposed converter station though the converter station and cable route are outside of the flood extent. Modelled depths from this event are between 0.03-0.96 m.

Similar to the 1% AEP event, the 0.1% AEP combined fluvial/tidal event is slightly larger than the tidal event with flooding focused around the same area of land within the EOS. The River Ouse HDD crossing is within the flood extent as is the proposed cable route. Depths at this overlap reach maximum values of 0.07 m.

5.3 Climate Change

The impacts of climate change have been assessed using the guidance and allowances detailed in section 0. In the absence of modelled data, Flood Zone 2 can be used as a proxy for possible future risk as a result of climate change. As overall fluvial and tidal flood risk to the EOS is low within route sections 1, 2 and 3, the risk from climate change has also been concluded as being low in these route sections. In route section 4, the majority of this route section is within the extents of Flood Zone 2 and 3 and therefore climate change risk to this route section is concluded to be high.

5.4 Flood Defences

Route section 1 – Landfall to Bainton

The Environment Agency's Spatial Flood Defences dataset show that there are several privately owned and operated areas of high ground, these have presumed to not be formal flood defences, as well as a single area of Environment Agency operated embankments that intersect with Route section 1 of the EOS. These defences are located in the centre of the route section near Driffield and Nafferton.

Route section 2 – Bainton to Market Weighton

There are no flood defences within close proximity to the EOS according to the Environment Agency's Spatial Flood Defence dataset.

Route section 3 – Market Weighton to River Ouse

Route section 3 intersects with defences including: Environment Agency owned and operated embankments alongside the River Ouse, areas of high ground which are not considered to be formal defences along the River Foulness owned and operated by the Ouse and Humber Internal Drainage Board and high ground areas along Market Weighton Canal.

Route section 4 – River Ouse to Drax Substation

Embankments along the River Ouse, owned and operated by the Environment Agency, intersect with route section 4 of the EOS.

5.5 Flood Risk from Surface Water and Sewers

Flooding from surface water can be caused by rainfall being unable to infiltrate into the natural ground, entering the drainage system due to blockage, or from flows being above design capacity. This can result in (temporary) localised ponding and flooding. The natural topography and location of buildings/structures can influence the direction and depth of water flowing off impermeable and permeable surfaces.

Flooding from sewers occurs when the sewer is overwhelmed by heavy rainfall, becomes blocked or is inadequately designed. Sewers are generally designed to cope with mid to low order rainfall events (i.e. not to flood during events up to the 1 in 30 (3.33%) AEP.

The risk from surface water mapping is included in Figure 7, Figure 8 and Figure 9.

Table 5: Risk of Flooding from Surface Water Classification

Level of Flood Risk (Surface Water)	Description
High	Each year, the area has a chance of flooding of greater than 1 in 30 (3.33% AEP)
Medium	Each year, the area has a chance of flooding between 1 in 100 (1% AEP) and 1 in 30 (3.33% AEP)
Low	Each year, the area has a chance of flooding between 1 in 1000 (0.1% AEP) and 1 in 100 (1% AEP)
Very Low	Each year, the area has a chance of flooding less than 1 in 1000 (0.1% AEP)

Route section 1 – Landfall to Bainton

Route section 1 is included in areas identified as being at risk of surface water flooding, according to the Environment Agency Long Term Flood Risk Map. Flood risk from this source is very dispersed across the entire length of this route section, with numerous pockets of high risk (>1 in 30 /3.33% AEP) near Skerne, Wansford and north of Barmston. Two major flow pathways are seen near Fraisthorpe where surface water follows Demming Drain and Stonehills Drain before following Northfield Beck and Knorka Dike near Skerne.

According to data made available from Yorkshire Water, no Yorkshire Water owned sewer/drain records were identified within 750 m of the EOS cable route in route section 1 and as such there is no record of hydraulic failure or of flooding incidents captured in the DG5 register.

Three of the proposed construction compounds; compounds 1, 2 and 6 are within areas of high surface water flood risk. Compound 4 is partially in an area of medium risk, compounds 5, 7 and 8 are in areas of low risk of surface water flooding.

Two of the committed HDD pits are within areas at high risk of surface water flooding: the entry pit of HDD 14 and the exit pit of HDD 21. Two of the committed HDD pits are in areas at medium risk of surface water flooding: the exit pit of HDD 20 and the entry pit of HDD 21. Two committed HDD pits are in areas at low risk of surface water flooding: the entry pits of HDD 12 and HDD 20.

Six of the HDD pits with potential to open cut watercourses are in areas at high risk of surface water flooding. These are the exit pits of HDD 1 and HDD 4, both the entry and exit pits of HDD 6, the exit pit of HDD 13 and the entry pit of HDD 17. Two HDD pits with the potential to open cut watercourses are in areas at medium risk of surface water flooding: the exit pit of HDD 9 and the exit pit of HDD 19. Four of this type of HDD pit are located in areas at low risk of surface water flooding: the entry pit of HDD 3 and HDD 10, and both the entry and exit pits of HDD 16.

Additionally, two temporary joint bays are within areas of low surface water flood risk and a further two within medium surface water flood risk areas.

Route section 2 – Bainton to Market Weighton

This route section is within areas of surface water flood risk with these areas being contained to existing watercourses that intersect with the route section. These include Bowman Drain near Market Weighton and Bracken Beck, west of Kilnwick. There are also several additional flow paths of surface water flood risk which follows roads and paths which also intersect with route section 2. All of these pathways are mainly medium and low risk, though the path following Bowman Drain does include areas of high risk.

According to data made available from Yorkshire Water, there are no sewer/drain records within 750 m of the EOS cable route in route section 2 and as such there is no record of hydraulic failure or of flooding incidents captured in the DG5 register.

One of the proposed construction compounds, compound 11, is located partially in an area at high risk of surface water flooding. Two of the proposed construction compounds, compounds 9 and 12, are located in areas at low risk of surface water flooding.

None of the HDD pits are located in areas at risk of surface water flooding.

None of the temporary joint bays are within areas of surface water flood risk.

Route section 3 – Market Weighton to River Ouse

This route section of the EOS is within areas of surface water flood risk. Within this route section there are multiple areas shown to be at low risk though these are dispersed across the route section. There are three main areas where surface water flood risk appears to be following existing watercourses:

- Black Dyke near Newsholme;
- The River Foulness and Bishopsail Drain west of Spaldington; and
- Bells Beck, Bowmain Drain and the Market Weighton Canal located south of Market Weighton. This area includes areas of high risk though this is mainly confined to the channel.

According to data made available from Yorkshire Water, there are no sewer/drain records within 750 m of the EOS cable route in route section 3 and as such there is no record of hydraulic failure or of flooding incidents captured in the DG5 register.

Two of the proposed construction compounds; compounds 13 and 14, are within areas of low surface water flood risk.

One of the committed HDD pit locations is located in area at medium risk of surface water flooding: the exit pit of HDD 30. Three committed HDD pit locations are in areas at low risk of surface water flooding: the entry pit of HDD 30 and both the entry and exit pits of HDD 34.

Two of the HDDs with potential to open cut watercourses are at low risk of surface water flooding: the entry pit of HDD 28 and HDD 39.

Two of the proposed temporary joint bays are within areas of low surface water flood risk, and two in areas of medium risk.

Route section 4 – River Ouse to Drax Substation

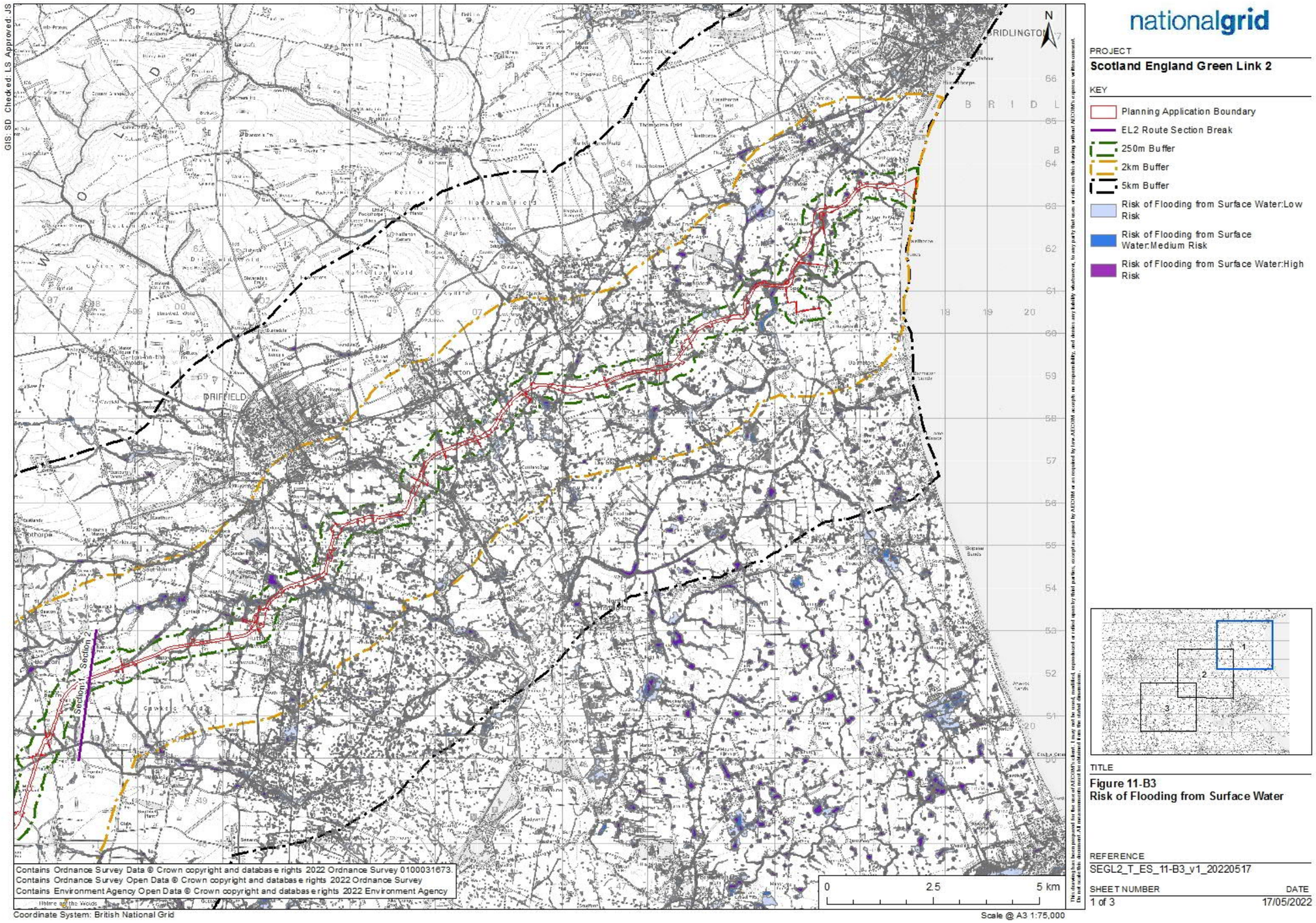
This route section of the scheme is within areas of surface water flood risk. There are multiple areas shown to be at low risk though these are dispersed. The proposed location of the converter station is mostly outside areas of surface water flood risk with only a small area within an area of low surface water flood risk.

According to the Environment Agency Long Term Flood Risk Map, surface water depths in the medium and low risk bands within the converter station are <300 mm. The same is true for the location of the construction compound.

Data extracted from the Yorkshire Water DG5 register, taken from the SDC SFRA, shows no internal sewer flooding record in and around the near vicinity of the Drax Power Station with the surrounding land additionally being in the lowest risk band of between 0-2 external sewer records.

One of the construction compounds, compound 18, is in an area at low risk of surface water flooding. One committed HDD pit location, the exit pit of HDD 41, is in an area at low risk of surface water flooding. One joint bay is within the extent of low surface water flood risk.

Figure 7: Flood Map for Surface Water: Extent of Flooding (Sheet 1 of 3)



nationalgrid

PROJECT
Scotland England Green Link 2

KEY

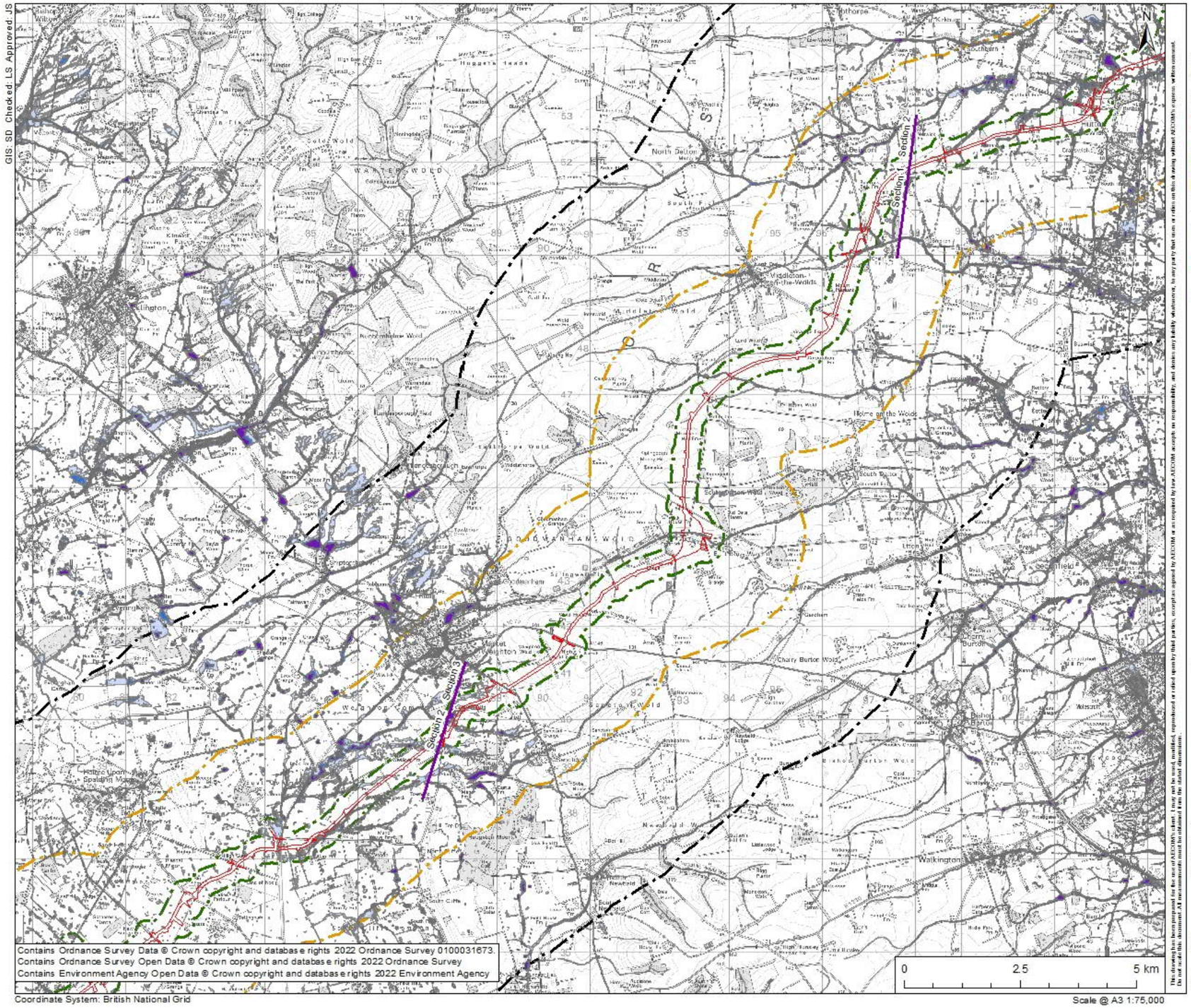
- Planning Application Boundary
- EL2 Route Section Break
- 250m Buffer
- 2km Buffer
- 5km Buffer
- Risk of Flooding from Surface Water:Low Risk
- Risk of Flooding from Surface Water:Medium Risk
- Risk of Flooding from Surface Water:High Risk

TITLE
Figure 11-B3
Risk of Flooding from Surface Water

REFERENCE
SEGL2_T_ES_11-B3_v1_20220517

SHEET NUMBER: 1 of 3
DATE: 17/05/2022

Figure 8: Flood Map for Surface Water: Extent of Flooding (Sheet 2 of 3)

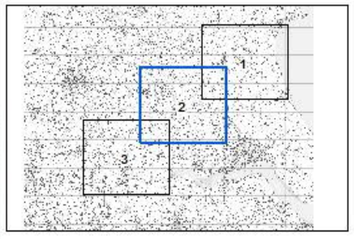


nationalgrid

PROJECT
Scotland England Green Link 2

KEY

- Planning Application Boundary
- EL2 Route Section Break
- 250m Buffer
- 2km Buffer
- 5km Buffer
- Risk of Flooding from Surface Water:Low Risk
- Risk of Flooding from Surface Water:Medium Risk
- Risk of Flooding from Surface Water:High Risk

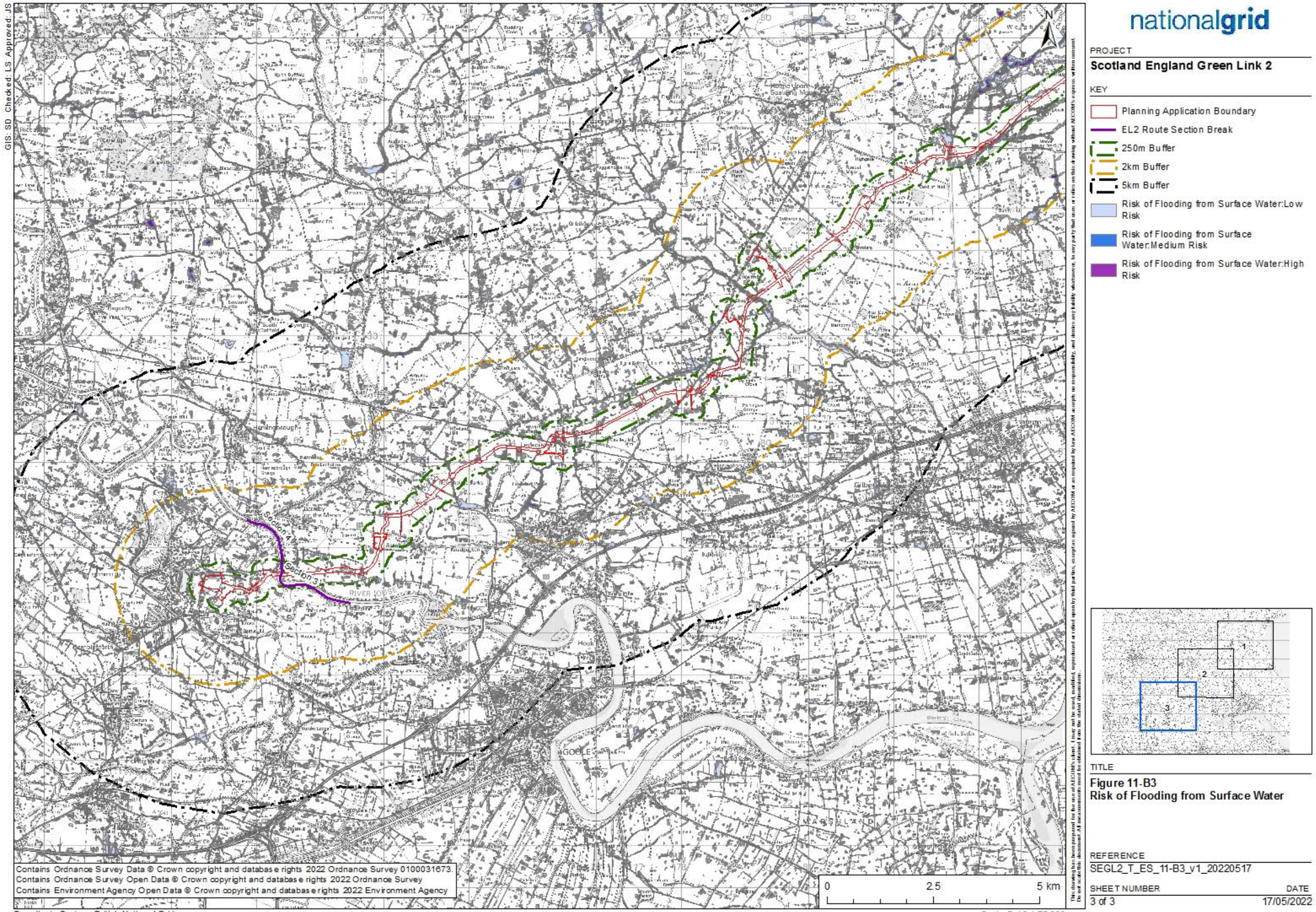


TITLE
Figure 11-B3
Risk of Flooding from Surface Water

REFERENCE
SEGL2_T_ES_11-B3_v1_20220517

SHEET NUMBER: 2 of 3
DATE: 17/05/2022

Figure 9: Flood Map for Surface Water: Extent of Flooding (Sheet 3 of 3)



5.6 Groundwater Flood Risk

Groundwater flooding occurs when the water table rises above ground level. This is as a result of substantial groundwater flow through permeable ground from surrounding land or from a spring line. Below ground structures such as basements are at particular risk from groundwater.

Route section 1 – Landfall to Bainton

The ERYC SFRA, using the Areas Susceptible to Groundwater Flooding (AStGWF) dataset which splits land into 1 km^2 tiles shows many of the tiles in this route section, between Bridlington and Driffield, having a ≥75% coverage of areas at high risk of groundwater flooding.

Route section 1 is noted as being within a Source Protection Zone (SPZ) Zone I (Inner Protection Zone), Zone II (Outer Protection Zone) and Zone III (Total Catchment) near Hutton Cranswick and Bainton.

Route section 2 – Bainton to Market Weighton

The ERYC SFRA, using the AStGWF dataset shows many of the tiles in this route section between Bainton and Market Weighton, have a <25% coverage of areas at high risk of groundwater flooding, with the centre of the route section having no data available.

Route section 2 is noted as being with a SPZ Zone III – Total Catchment.

Route section 3 – Market Weighton to River Ouse

The ERYC SFRA, using the AStGWF dataset shows many of the tiles in this route section, between Market Weighton and the River Ouse, have a ≥75% coverage of areas at high risk of groundwater flooding. The area between Market Weighton and Bursea has tiles of <25% coverage of areas at high risk of groundwater flooding from the River Ouse.

A small area of route section 3, adjacent to the River Ouse is within a SPZ Zone III (Total Catchment).

Route section 4 – River Ouse to Drax Substation

The SDC SFRA using the AStGWF shows many of the tiles between the River Ouse and the Drax Substation, have a <25% coverage of areas at high risk of groundwater flooding.

The majority of this route section, including the proposed location of the converter station is within a SPZ Zone III (Total Catchment).

5.7 Flood Risk from Artificial Sources, Residual Risk and Historic Flooding

Artificial sources of flooding include reservoirs, canals, ponds and mining abstraction.

The EOS crosses Driffield Canal at in route section 1 at Wansford. The EOS intersects Flood Zone 3 in this location; however, this is more likely associated with the River Hull, which runs parallel with the canal. It is concluded that the EOS is at a low risk of flooding from artificial sources.

Residual risk is defined as ‘the risk which remains after risk avoidance, reduction and mitigation measures have been implemented’. For the purpose of assessing flood risk, it is assumed that events greater than those assessed as actual risk are considered a ‘Residual Risk’.

Examples of residual flood risk include:

- the failure of flood management infrastructure such as a breach of a flood defence;
- blockage of a surface water conveyance system;
- overtopping of an upstream storage area;
- failure of a pumped drainage system;
- failure of a reservoir; or

- a particularly severe flood event which overwhelms defences or conveyance capacities.

Route section 1 – Landfall to Bainton

This route section of the EOS does cross the Driffield Navigation Canal, southeast of Driffield which is within areas of Flood Zone 3. The River Hull flows parallel to the canal and is the likely source of the Flood Zones within this area of overlap.

This route section of the EOS is not shown to be within flood extents from potential reservoir breaches, according to the Environment Agency's Long Term Flood Risk Map, meaning that this route section is at very low risk of reservoir flooding.

Route section 1 of the EOS is within the extents of the Environment Agency Historic Flood Map, associated with unnamed ordinary watercourses.

Route section 2 – Bainton to Market Weighton

There are no artificial waterbodies identified within this route section of the EOS.

This route section of the EOS is not shown to be within flood extents from potential reservoir breaches, according to the Environment Agency's Long Term Flood Risk Map, meaning that this route section is at very low risk of reservoir flooding.

Route section 2 of the EOS is not shown to be within any previously recorded flood event extents according to the Historic Flood Map.

Route section 3 – Market Weighton to River Ouse

Route section 3 of the EOS does not cross any artificial waterbodies.

Parts of this route section, including three construction compounds, 11 committed HDD locations, 10 HDD pit locations with the potential to open cut watercourses and seven temporary joint bays are within Environment Agency "wet day" reservoir failure flood extents. "Wet day" reservoir failure flood extents assumes a worst case scenario of reservoirs failing on a "wet day" when local rivers have already overflowed their banks. The data represents a credible worst case scenario, however it is unlikely that any flood would be as large as shown and the data gives no indication of likelihood or probability of such an occurrence. It is not clear from the available mapping which reservoir is the source of these flood extents.

The construction compounds at risk of flooding caused by reservoir failure are compounds 13, 16 and 17. The HDD pit locations at risk are the entry and exit pits of HDD 27, HDD 30, HDD 32, HDD 33, HDD 34, HDD 35, HDD 37, HDD 38, HDD 39 and HDD 40 as well as the entry pit of HDD 4.

Route section 3 is within the extent of the Historic Flood Map associated with the River Foulness, River Derwent, River Ouse, New Drain and other unnamed ordinary watercourses.

Route section 4 – River Ouse to Drax Substation

Route section 4 of the EOS does not cross any artificial waterbodies.

Route section 4 is within reservoir flood extents though it is not clear from the available mapping which reservoir is the source of these flood extents.

Route section 4 is within Historic Flood Map extents associated with River Ouse.

5.8 Summary of Flood Risk

The NPPF (2021) describes potential sources of flooding. It is necessary to consider the risk of flooding from all sources within an FRA. This route section has provided a review of flooding from land, sewers, groundwater and artificial sources, in addition to that from rivers and the sea.

Table 6 summarises the sources of flood risk at the site.

Table 6: Summary of Flood Risk

EOS Route Section	Source of risk	Ongoing risk
Route section 1 (Landfall to Bainton)	Fluvial Flood Risk	Medium risk
	Tidal Flood Risk	Low risk
	Flood Risk from Surface Water and Sewers	Low risk
	Groundwater Flood Risk	Low risk
	Flood Risk from Artificial Sources, Residual Risk and Historic Flooding	Very low risk
Route section 2 (Bainton to Market Weighton)	Fluvial Flood Risk	Low risk
	Tidal Flood Risk	Very low risk
	Flood Risk from Surface Water and Sewers	Low risk
	Groundwater Flood Risk	Very low risk
	Flood Risk from Artificial Sources, Residual Risk and Historic Flooding	Very low risk
Route section 3 (Market Weighton to River Ouse)	Fluvial Flood Risk	Medium risk
	Tidal Flood Risk	Low risk
	Flood Risk from Surface Water and Sewers	Low risk
	Groundwater Flood Risk	Low risk
	Flood Risk from Artificial Sources, Residual Risk and Historic Flooding	Medium risk
Route section 4 (River Ouse to Drax Substation)	Fluvial Flood Risk	Medium risk
	Tidal Flood Risk	Low risk
	Flood Risk from Surface Water and Sewers	Very low risk
	Groundwater Flood Risk	Very low risk
	Flood Risk from Artificial Sources, Residual Risk and Historic Flooding	Medium risk

6. Flood Risk Management Considerations and Assessment

6.1 Principles of Flood Risk Management

The general approach of the NPPF and PPG is to encourage a risk-based approach to planning. This is to direct possible new development to areas at the least risk of flooding. As flood risk is a combination of the probability of flooding and the consequence of flooding, using the principle of risk management, where flood risk cannot be completely eliminated, the most vulnerable parts of the development should be placed away from the risk.

6.2 Route section 1 – Landfall to Bainton

The EOS cable route intersects with areas of Flood Zone 3 at 10 locations within Route section 1. There is a risk of flooding at these locations, but these crossings are located in predominantly rural areas meaning the sensitivity of any nearby receptors can be considered low. Embedded flood risk mitigation includes that the scheme designs, where possible, have been located in areas at low risk of flooding so as to avoid flood risk.

None of the proposed construction compounds overlap with either Flood Zone 2 or 3 though, three of these compounds do intersect with areas of high risk surface water and may therefore increase surface water runoff locally. The areas at risk are mostly small proportions of these construction compounds and are not shown to affect a majority of the compound area. Embedded flood risk mitigation includes attenuation ponds or subbase storage at construction compounds. In addition, discharge will be pumped or gravity fed to local watercourses via pre-identified outfalls. The number of attenuation ponds or subbase storage areas and storage volumes will be subject to final design and compound configuration. Discharge to local watercourses will be limited to 1.4 l/s/ha or 1.0 l/s/ha for small sites with an allowance for +40% climate change. This mitigation will be included in the drainage strategy produced by the appointed Contractor.

Two of the HDD pit locations (with the potential to open cut watercourse) are shown to be partially within Flood Zone 2 and 3. Additionally, several of the HDD pit locations are within surface water flood risk areas including two with high risk areas, one with medium risk areas and three with low risk areas. One of the HDD pit locations is shown to be partially within areas of Flood Zone 2 and 3 with four of these locations also within areas of low surface water flood risk. Embedded flood risk mitigation includes that the scheme design features, where possible, are located in areas at low risk of flooding so as to avoid flood risk.

One of the proposed temporary joint bays within route section 1 is located within Flood Zone 3. Additionally, three of these bays are within areas of low surface water flood risk and a further two within medium surface water flood risk areas. The location of these temporary joint bays is to be finalised by the appointed Contractor and so the locations currently given are only indicative. As the infrastructure of these temporary joint bays is to be buried; with soil and grass placed on the concrete pad, the potential runoff is considered to be low. Embedded flood risk mitigation includes that the scheme design features, where possible, are located in areas at low risk of flooding so as to avoid flood risk.

The crossing of field drains, included in the 44 watercourses crossed by route section 1 of the EOS, could cause flow to back up on surrounding field drains and in turn increase risk to flood risk receptors including people, property and infrastructure. Embedded flood risk mitigation includes the incorporation of a temporary drainage strategy following the removal or disruption of field drainage channels that were affected during the cable construction process to set out mitigation and water management requirement during temporary works and upon reinstatement.

There are 44 watercourses identified as being crossed by route section 1 of the EOS. Culverting of some ordinary watercourses and drains is proposed where haul roads cross these watercourses. The installation of culverts may impact upon the existing flow regime and may cause an increase inflows with risk of flooding to the surrounding land This assessment has been completed on the assumption

that installation will be included for watercourses and surface water flood paths caused by haul roads. Embedded mitigation for the potential flood risk includes a pre-installed culvert of suitable size to accommodate the water volumes and flows necessary through agreement with the landowner and LLFA.

There are three proposed temporary bridge crossings of watercourses within route section 1. Bridge crossings will be located where haul roads are proposed to cross watercourses, either directly on the route or offset where constraints dictate. The structures will be placed at some location within the 40m working width. These temporary bridge crossings have the potential to impact on existing flow regimes and thus cause flooding to surrounding land. Of these crossings, two are located within the extents of Flood Zone 3. Specific flood risk mitigation includes the construction of bridge soffit levels at least 0.6 m higher than the top of the bank on both sides of the watercourse following standard guidance for flood risk activity permits.

Installation of the below ground DC cable has the potential to cause severance, disturbance, or blockage to the underground field drainage infrastructure, such as private land or agricultural drainage and utilities infrastructure. Though data supplied by Yorkshire Water indicated that they had no records of sewers or drains in the near vicinity of route section 1 of the EOS. Where the EOS affects private land and agricultural drainage, a post scheme drainage design on an individual field basis will be developed after consultation with affected landowners. Where the EOS affects utility infrastructure, such as that owned and operated by Yorkshire Water, embedded flood risk mitigation includes the addition of temporary diversions during works where underground drainage infrastructure is directly encountered.

According to data made available from Yorkshire Water, there is no record of hydraulic failure of flood incidents to development within route section 1 of the EOS from this source.

The Ouse CFMP did not state that flood risk from this source was an issue along with no recorded flood incidences of groundwater flooding and low risk ratings according to the AStGWF. Therefore, the overall risk of groundwater flooding to route section 1 of the EOS is considered to be very low

6.3 Route section 2 – Bainton to Market Weighton

The EOS cable route does not intersect with areas of either Flood Zone 2 or 3 within route section 2.

None of the proposed construction compounds overlap with areas identified as being Flood Zone 2 or 3. Two of the proposed construction compounds within Route section 2 are within areas of low risk surface with one within areas of medium water and thus are not expected to increase existing surface runoff rates. Embedded flood risk mitigation includes attenuation ponds or subbase storage at construction compounds. In addition, discharge will be pumped or gravity fed to local watercourses via pre-identified outfalls. The number of attenuation ponds or subbase storage areas and storage volumes will be subject to final design and compound configuration. Discharge to local watercourses will be limited to 1.4 l/s/ha or 1.0 l/s/ha for small sites with an allowance for +40% climate change. This mitigation will be included in the drainage strategy produced by the appointed Contractor.

None of the HDD pit locations are shown to be within areas of Flood Zone 2 and 3 with one being within an area of medium surface water flood risk.

None of the proposed temporary joint bays within route section 2 are located within Flood Zone 2 or 3 or within areas of surface water flood risk.

The crossing of field drains, included in the five watercourses crossed by route section 2 of the EOS, could cause flow to back up on surrounding field drains and in turn increase risk to people, property and infrastructure flood risk receptors. Embedded flood risk mitigation includes the incorporation of a temporary drainage strategy following the removal or disruption of field drainage channels that were affected during the cable construction process to set out mitigation and water management requirement during temporary works and upon reinstatement.

Temporary culverting of some ordinary watercourses and drains is proposed, where haul roads cross these watercourses. . This assessment has been completed on the assumption that installation will be

included for watercourses, including the five within route section 2, and surface water flood paths caused by haul roads. Embedded mitigation for the potential flood risk includes a pre-installed culvert of suitable size to accommodate the water volumes and flows necessary through agreement with the landowner and LLFA.

Installation of the below ground DC cable has the potential to cause severance, disturbance, or blockage to the underground field drainage infrastructure, such as private land or agricultural drainage and utilities infrastructure. Though data supplied by Yorkshire Water indicated that they had no records of sewers or drains in the near vicinity of route section 2 of the EOS. Where the EOS affects private land and agricultural drainage, a post scheme drainage design on an individual field basis will be developed after consultation with affected landowners. Where the EOS affects utility infrastructure, such as that owned and operated by Yorkshire Water, embedded flood risk mitigation includes the addition of temporary diversions during works where underground drainage infrastructure is directly encountered. According to data made available from Yorkshire Water, there is no record of hydraulic failure of flood incidents to development within route section 2 of the EOS from this source.

The Ouse CFMP did not state that flood risk from this source was an issue along with no recorded flood incidences of groundwater flooding and low risk ratings according to the AStGWF. Therefore, the overall risk of groundwater flooding to route section 2 of the is considered to be very low.

6.4 Route section 3 – Market Weighton to River Ouse

The EOS cable route intersects with areas of Flood Zone 3 at six locations within route section 3. These intersections are located within predominantly rural areas away from major population centres though there are isolated farms within near proximity to these crossings. The intersections are, in some locations, extensive and include the width of the 40 m working width. Embedded flood risk mitigation includes that the scheme designs, where possible, have been located in areas at low risk of flooding so as to avoid flood risk.

One of the proposed construction compounds is within Flood Zone 3 with another two within Flood Zone 2. Two of these compounds also overlap with areas of low surface water flood risk meaning that these locations are at potential risk of flooding. Embedded flood risk mitigation includes attenuation ponds or subbase storage at construction compounds. In addition, discharge will be pumped or gravity fed to local watercourses via pre-identified outfalls. The number of attenuation ponds or subbase storage areas and storage volumes will be subject to final design and compound configuration. Discharge to local watercourses will be limited to 1.4 l/s/ha or 1.0 l/s/ha for small sites with an allowance for +40% climate change. This mitigation will be included in the drainage strategy produced by the appointed Contractor.

One of the construction compounds is also within the extents for reservoir inundation flooding though it should be noted that these outlines detail the potential maximum extent of flooding from this source and not the likelihood. Flood risk mitigation should be implemented in the form of the supervisory personnel of the construction compound should sign up to receive advance flood warnings in the case of a reservoir flood incident.

Four of the HDD pit locations (with the potential to open cut watercourse) are within Flood Zone 3. Ten of the HDD pit locations are within Flood Zone 3 with a further seven in Flood Zone 2. One of these HDD pits is also within areas of low surface water flood risk. Additionally, two of the HDD locations are also wholly within the maximum extent for reservoir flooding inundation. Embedded flood risk mitigation includes that the scheme designs, where possible, have been located in areas at low risk of flooding so as to avoid flood risk.

Eight of the proposed temporary joint bays within route section 3 are located within Flood Zone 3 with two within Flood Zone 2. Additionally, one of the bays is within areas of low surface water flood risk with another within areas of medium surface water flood risk. The location of these temporary joint bays is to be finalised at the detailed design stage and so the locations currently given are only indicative of their location. Embedded flood risk mitigation includes that the scheme designs, where possible, have been located in areas at low risk of flooding so as to avoid flood risk.

The crossing of field drains, included in the 46 watercourses crossed by route section 3 of the EOS, could cause flow to back up on surrounding field drains and in turn increase risk to people, property and infrastructure flood risk receptors. Embedded flood risk mitigation includes the incorporation of a temporary drainage strategy following the removal or disruption of field drainage channels that were affected during the cable construction process to set out mitigation and water management requirement during temporary works and upon reinstatement.

There are 46 watercourses identified as being crossed by route section 3 of the EOS. Temporary culverts are proposed where haul roads cross ordinary watercourses and drains. The installation of culverts may impact upon the existing flow regime and may cause an increase in flows with risk of flooding to the surrounding land. This assessment has been completed on the assumption that installation will be included for watercourses and surface water flood paths caused by haul roads. Embedded mitigation for the potential flood risk includes a pre-installed culvert of suitable size to accommodate the water volumes and flows necessary through agreement with the landowner and LLFA.

There are two proposed temporary bridge crossings of watercourses within route section 3. Bridge crossings will be located where haul roads are proposed to cross watercourses, either directly on the route or offset where constraints dictate The structures will be placed at some location within the 40 m working width. These temporary bridge crossings have the potential to impact on existing flow regimes and thus cause flooding to surrounding land. The locations of the proposed bridge crossings are both within the extent of Flood Zone 3 with one also being within areas of low surface water flood risk. Specific flood risk mitigation should include the construction of bridge soffit levels at least 0.6 m higher than the top of the bank on both sides of the watercourse following standard guidance for flood risk activity permits.

Installation of the below ground DC cable has the potential to cause severance, disturbance, or blockage to the underground field drainage infrastructure, such as private land or agricultural drainage and utilities infrastructure. Though data supplied by Yorkshire Water indicated that they had no records of sewers or drains in the near vicinity of route section 3 of the EOS. Where the EOS affects private land and agricultural drainage, a post scheme drainage design on an individual field basis will be developed after consultation with affected landowners. Where the EOS affects utility infrastructure, such as that owned and operated by Yorkshire Water, embedded flood risk mitigation includes the addition of temporary diversions during works where underground drainage infrastructure is directly encountered. According to data made available from Yorkshire Water, there is no record of hydraulic failure of flood incidents to development within route section 3 of the EOS from this source.

The Ouse CFMP did not state that flood risk from this source was an issue along with no recorded flood incidences of groundwater flooding and low risk ratings according to the AStGWF. Therefore, the overall risk of groundwater flooding to route section 3 of the is considered to be very low.

6.5 Route section 4 – River Ouse to Drax Substation

The EOS cable route of route section 4 is entirely within Flood Zone 3. The cable passes through rural areas of land.

Both of the proposed construction compounds are within Flood Zone 3, with one also overlapping with a small area of high surface water flood risk in a localised space. Embedded flood risk mitigation includes attenuation ponds or subbase storage at construction compounds. In addition, discharge will be pumped or gravity fed to local watercourses via pre-identified outfalls. The number of attenuation ponds or subbase storage areas and storage volumes will be subject to final design and compound configuration. Discharge to local watercourses will be limited to 1.4 l/s/ha or 1.0 l/s/ha for small sites with an allowance for +40% climate change. This mitigation will be included in the drainage strategy produced by the appointed Contractor.

All five of the proposed HDD pit locations included in route section 4 are wholly within Flood Zone 3 with one also being partially within areas of low risk surface water. Embedded flood risk mitigation includes that the scheme designs, where possible, have been located in areas at low risk of flooding so as to avoid flood risk.

The single proposed temporary joint bay within route section 4 is located within both Flood Zone 3 and areas of low surface water flood risk. The location of these temporary joint bays is to be finalised at the detailed design stage and so the locations currently given are only indicative of their location. As the infrastructure of these temporary joint bays is to be buried; with soil and grass placed on the concrete pad, the potential runoff is considered to be low. Embedded flood risk mitigation includes that the scheme designs, where possible, have been located in areas at low risk of flooding so as to avoid flood risk.

The crossing of field drains, included in the 11 watercourses crossed by route section 4 of the EOS, could cause flow to back up on surrounding field drains and in turn increase risk to people, property and infrastructure flood risk receptors. Embedded flood risk mitigation includes the incorporation of a temporary drainage strategy following the removal or disruption of field drainage channels that were affected during the cable construction process to set out mitigation and water management requirement during temporary works and upon reinstatement.

There are 11 watercourses identified as being crossed by route section 4 of the EOS. Culverting of some ordinary watercourses and drains is proposed where haul roads cross these watercourses. The installation of culverts may impact upon the existing flow regime and may cause an increase in flow with risk of flooding to the surrounding land. This assessment has been completed on the assumption that installation will be included for watercourses and surface water flood paths caused by haul roads. Embedded mitigation for the potential flood risk should include a pre-installed culvert of suitable size to accommodate the water volumes and flows necessary through agreement with the landowner and LLFA.

Installation of the below ground DC cable has the potential to cause severance, disturbance, or blockage to the underground field drainage infrastructure, such as private land or agricultural drainage and utilities infrastructure. Though data supplied by Yorkshire Water indicated that they had no records of sewers or drains in the near vicinity of Section 4 of the EOS. Where the EOS affects private land and agricultural drainage, a post scheme drainage design on an individual field basis will be developed after consultation with affected landowners. Where the EOS affects utility infrastructure, such as that owned and operated by Yorkshire Water, embedded flood risk mitigation includes the addition of temporary diversions during works where underground drainage infrastructure is directly encountered. Additional data taken from the Yorkshire Water DG5 register include in the SDC SFRA, shows no internal sewer flooding records around and in the vicinity of the Drax power station with the surrounding area being in the lowest band of 0-2 external sewer records.

The Ouse CFMP did not state that flood risk from this source was an issue along with no recorded flood incidences of groundwater flooding and low risk ratings according to the AStGWF. Therefore, the overall risk of groundwater flooding to route section 4 of the is considered to be very low.

6.6 Section 5 – Drax Converter station

The proposed converter station is shown to be within areas of Flood Zone 3 as well as modelled outputs from the Ouse model in a 1% AEP +50%CC event and 0.1% AEP +50%CC event. The proposed design is for this area to be raised above the 0.1% AEP+50% CC event modelled flood level including freeboard, which is greater than the minimum Environment Agency requirement for the proposed design be above the modelled flood level of the 1% AEP +39% CC event. The model flood levels are set out in the Appendix 11-C Hydraulic Modelling Technical Note. As the risk to this site is primarily fluvial and is currently located in Flood Zone 3, hydraulic modelling was undertaken to quantify this displaced flood water. This determined a de minimis (negligible) impact as result of the development. As such it is expected that floodplain compensation will not be required for this scheme. However, level-for-level volume-for-volume floodplain compensation requirements up to the 1% AEP+CC event have been calculated should this be required by the regulator at 63,254m^3.

In addition, a specific drainage strategy for the converter station will be developed. SuDS in the form of swales and attenuation ponds will be included in the design of the proposed converter station to mitigate surface water runoff rates to greenfield rates.

The Exception Test includes a requirement to act sequentially when selecting sites for development, as set out in NPPF 2021 guidance. In order to demonstrate compliance with this requirement a process of

site selection was undertaken to identify that Drax is the most appropriate point on the network for the EOS to connect to. The site selection process looked at converter station sites in the vicinity of the Drax, up to a distance of 5km away. The site selection process was required to reconcile a range of factors including environmental impacts and engineering requirements. When considering the extent of Flood Zone 2 and 3 at Drax, the converter station would be required to be located a significant distance from Drax substation in order to be located in Flood Zone 1, which would have caused a greater environmental impact as the converter station would be located in open countryside. In addition, a longer AC cable would be required to link the converter station back to Drax substation, which has wider working width than a DC cable. Therefore it was considered more appropriate to locate the proposed converter station in Flood Zone 3 and mitigate potential impacts. The site selection process is described in greater detail in the Alternatives Chapter (Chapter 5.8.2) of the Environmental Statement.

The EOS and the converter station are essential infrastructure.

As the converter station is classified as ‘essential infrastructure’ development it is permitted in Flood Zone 3 subject the application and passing of the Exception Test, in accordance with Paragraph 163 and 164 of the NPPF, which requires that;

- The development would provide sustainability benefits to the community that outweigh flood risk and;
- The development will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere and where possible will reduce flood risk overall.

The converter station has been designed to be flood resilient with the area to be raised above the 0.1% AEP +39% CC event modelled flood event level, including freeboard. As stated above this exceeds the Environment Agency requirement for the development to be higher than the modelled flood levels of the 1% AEP event. Furthermore, required volumes of compensatory storage anticipated to be required to be provided to offset land raising have been calculated to mitigate any increase in risk elsewhere. A surface water drainage strategy for the converter station will be developed which will conform employ SuDS to mitigate flood risk on and off the site. This proposed land raising means that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere.

Community benefits associated with the EOS are reported elsewhere but include the creation employment opportunities associated with both the construction phase of the scheme and permanent elements of the scheme in the operational phase.

In response to the UK and Scottish Government’s legally binding commitment to reach net zero in their greenhouse gas emissions by 2050 and 2045 respectively, the way in which energy is generated is undergoing transformational change. The past year has seen increased ambition for offshore wind in particular with the UK Government’s Ten Point Plan re-affirming the commitment to reach 40 gigawatts (GW) of installed capacity by 2030, the British Energy Security Strategy increasing this to an ambition to reach 50GW by 2030, and the recent Scotwind leasing round awarding rights to develop up to 25 GW of offshore wind capacity in Scottish waters. Huge volumes of renewable energy generation including onshore and offshore wind as well as interconnectors will connect to the electricity transmission system over the coming years.

To economically and efficiently transmit this energy from where it is generated to where it is needed there is a requirement to increase the capability of the electricity transmission system. Electricity demand is predominantly located in the south of Great Britain, leading to high north-south power flows. These flows are highly variable due to the intermittent nature of renewable generation and interconnection. The north-south flows contribute significantly to potential constraints across the transmission system. To operate the network safely and efficiently, north-south power flows across the Scotland England boundary cannot exceed the capability of the network between the two regions.

The need for SEGL2 is based on providing additional network capability across boundaries in Scotland and England and to increase capability to accommodate (primarily) additional North-South flows on the network. This is due to increasing quantities of power generation (particularly onshore and offshore wind generation) and interconnection capacity in Scotland and the north east of England which will significantly increase cross-border and north-south boundary transfer requirements over time.

Reinforcements to provide increased boundary transfer capability are required to ensure the economic and efficient operation of the transmission system in line with NGET's statutory obligations. This will prevent excessive constraints from occurring and allow the network to keep pace with projected growth supporting the UK and Scottish Governments' net zero ambitions.

The EOS will provide sustainability benefits to the community that outweigh flood risk.

The EOS will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere.

Therefore, the EOS meets both of the tests identified at Paragraphs 163 and 164 of the NPPF and should be permitted in accordance with Paragraph 165 of the NPPF. The EOS complies with and is in accordance with the ERYC and SDC development plans.

7. Conclusion and Recommendations

This FRA report has been undertaken to review the risk associated with the EOS of SEGL2 in East Riding of Yorkshire and Selby District, North Yorkshire.

A flood risk appraisal has been undertaken to assess all sources of flood risk to the EOS and to ensure that flood risk will not be increased elsewhere as a result of the development. This is in line with the requirements of NPPF and using publicly available sources of information.

Overall, flood risk to the EOS from various sources is between low and medium risk with a summary of the flood risk to the EOS is included in Table 6.2. Fluvial sources present the greatest risk to all sections with groundwater and artificial sources (including residual risk and historic flooding) providing overall the least amount of risk. Several temporary elements of the EOS, namely the construction compounds, HDD pits and bridge crossings are shown to be vulnerable to flooding during the construction phase, but as temporary works will not have an enduring risk of flooding at the completion of this phase. The converter station, as permanent infrastructure is at risk of fluvial flooding in both the construction and operational phase, however the converter station has been designed to be flood resilient including ground raising and the development of a drainage strategy.

Detailed design of the scheme will inform further details of the construction, including the exact locations within the 40m working width and site level details of much of the proposed infrastructure across the EOS. As such, the assessment of flood risk undertaken in this report, both to and from temporary construction compounds, temporary HDD pits and temporary joint bays is based on currently available information. This means that conservative assumptions have been made where necessary to assess the potential flood risk.

A series of embedded mitigation efforts have been included in the scheme design. This includes but is not limited to:

- where possible, the scheme design has located infrastructure in areas at low risk of flooding from all assessed sources;
- inclusion of temporary drainage systems within infrastructure to capture and better manage any additional runoff;
- all discharges to be attenuated to, at most, existing greenfield runoff rates with a preference for betterment unless otherwise agreed with a stakeholder;
- the production of a scheme appropriate surface water management plan (SWMP);
- inclusion of appropriately designed and sized culverts and bridge crossings;
- being part of early flood warning systems where this is available;
- preferential design towards below-ground infrastructure to limit temporary/permanent above-ground infrastructure; and
- any temporary infrastructure such as compound access/haul roads to be removed when construction is completed.

Ground levels at the proposed converter station will be raised to ensure that the converter station is raised above the modelled flood level of the 0.1% AEP +39% CC event flood event.

A drainage strategy will be developed for the cable works and converter station which will conform to principles of capturing additional runoff and ensuring that runoff rates and discharge to the surrounding environment are maintained at the current greenfield runoff rate.

There should be sufficient management of the construction works to comply with the necessary standards and consent conditions as identified by the Environment Agency. In addition, much of the proposed designs for the EOS will require a completed Flood Risk Activity Permit (FRAP) to explain and justify the works.

The temporary components of the EOS are only at risk of flooding during the construction phase and represent no long term flood risk to receptors.

The Sequential and Exception Tests have been applied concerning the location of permanent infrastructure; the proposed converter station. The Sequential Test has demonstrated that the converter station cannot be placed in an alternate location outside Flood Zone 3 taking into account the wider sustainable development objectives and the contribution that the EOS makes to the urgent national need for such essential infrastructure.

The primary objective of the Project is to reinforce the electricity network and increase transmission network capability between Scotland and northern England by 2029 in order to enable the efficient and economic transmission of electricity. The Exception Test has demonstrated that, along with the socio economic benefits associated with the EOS, such as improved infrastructure, supporting net zero targets and employment opportunities, the urgent need for the EOS and the community and national benefits that the EOS would deliver outweigh the flood risk. This is in addition to other benefits including the timing of the delivery and the delivery of biodiversity net gain.The Exception Test has also demonstrated that the proposed mitigation including land raising means that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere.

Therefore, the EOS meets both of the tests identified at Paragraphs 163 and 164 of the NPPF and should be permitted in accordance with Paragraph 165 of the NPPF. The EOS complies with and is in accordance with the ERYC and SDP development plans.

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