

LACKENBY ENVIRONMENTAL STATEMENT

VOLUME 3: TECHNICAL APPENDICES
APPENDICES TO CHAPTER F
(WATER MANAGEMENT AND FLOODING)

Lackenby, South Tees

Volume 3: Appendices

Chapter F: Water Management

December 2020

Appendix F1: Summary of Consultation

Alice Gent

From: Alice Gent
Sent: 23 November 2020 10:45
To: NA NE, Planning
Cc: Heather Kerr; Heather Overhead
Subject: FW: 2020s1483: Environment Agency Planning Consultee Letter (Alice)

Dear Sir / Madam,

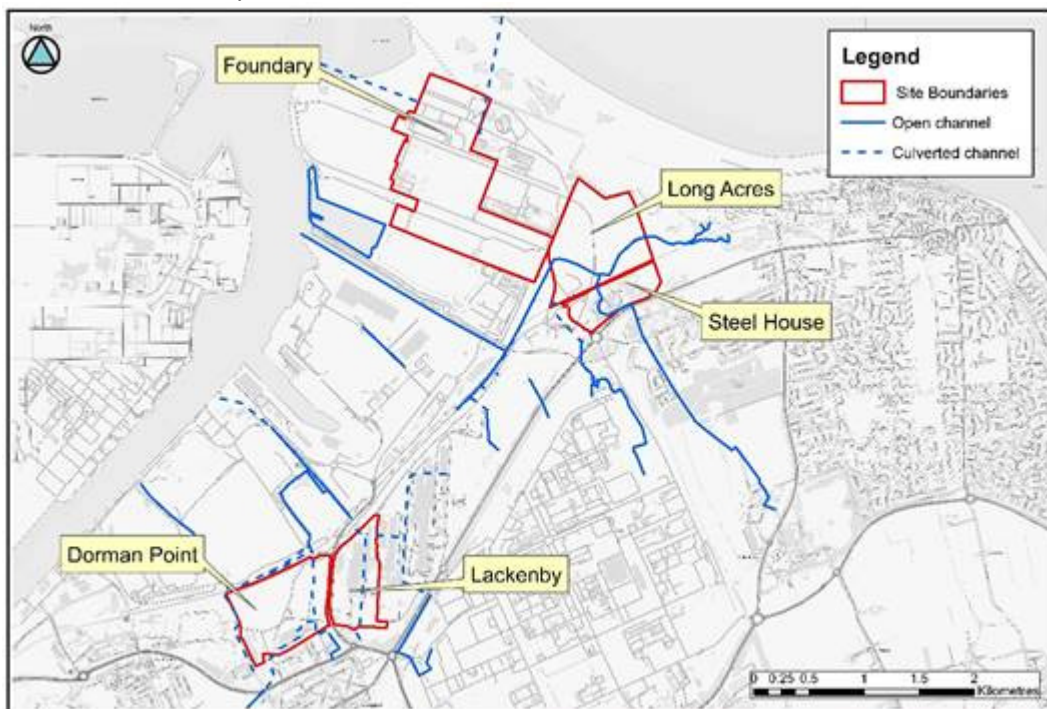
We are writing to consult with the Environment Agency Planning Department regarding 5 proposed developments at the South Tees Development Corporation site, for which we have been commissioned by Lichfield to undertake the water management and drainage assessment for each site for ES chapters,

The proposal and nature of the ES is high level for the purpose of achieving outline planning permission and so whilst additional consultation would be sought with the EA when further details are available, we would be grateful for your comments at this early stage on water management, flooding and hydrogeology

We would also be grateful for any flood records in the area with which you could provide us since the appendices to the ES chapters include a high level Flood Risk Assessment .

The five projects and further details are provided below:

- Lackenby
- Long Acres
- Steel House
- Dorman Point; and
- The Foundry



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Lackenby

The proposed development site is located in the South Industrial Zone (SIZ - SIZ3) of the STDC area as part of the Lackenby development - hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 55389 21574. The site is 192ha (1,920,000m²) in size and comprises buildings and structures associated with the former SSI BOS and CONCAST steelworks and Tata Steel's vacant coil plate mill.

Long Acres

The proposed development site is located in the STDC area as part of the Teardrop Site and CLE31 – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 57432 24736. The site is 65.9ha (659,000m²) in size and is located at the River Tees estuary, approximately 1.5km north west of Redcar Town Centre.

Steel House

The proposed development site is located in the STDC area as part of the North East Industrial Zone (NEZ1) – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) 457709 524179. The site is 44.9ha (449,000m²) in size and comprises brownfield land at the River Tees estuary, located 5km to the west of Redcar. Current vehicular access to the site is from the south along the A1085 (Trunk Road).

Dorman Point

The proposed development site is located in the STDC area of Dorman Point (also known as Grangetown Prairie) – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 54753 21317. The site is part of the South Industrial Zone (SIZ – SIZ2) region of the proposed STDC area and is 57.8ha (587,000m²) in size and comprises brownfield land at the River Tees estuary, located 5km to the west of Redcar.

The Foundry

The proposed development site is located in the STDC area as part of the Redcar Works Complex – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 56195 25378. The site is 80.9ha (809,000m²) in size and is located at the River Tees estuary, approximately 3.2km to the west of Redcar.

Kind regards,
Alice

Alice Gent

Senior Chartered Analyst | www.jbaconsulting.com | t:0131 319 2940

COVID-19. JBA has remained open for business throughout the Coronavirus pandemic. However, by adopting more flexible working I may not always be available in the office but my direct contact number is 07724923960.

Alice Gent

From: Steve Wharton <steve.wharton@nwl.co.uk>
Sent: 14 December 2020 14:40
To: Alice Gent
Subject: RE: 2020s0709: South Tees - EIA Consultation [2020s1483]

Hi Alice,

I can conform that I am happy for you to re-use the previous advice given.

Thanks
Steve

Stephen Wharton

Developer Services (Planning and Wastewater) Manager

☎ 0191 419 6617 | ☎ 36617
📞 07713 987544 | 📞 76718
✉ steve.wharton@nwl.co.uk

Leat House | Pattinson Road | Washington | NE38 8LB



From: Alice Gent <Alice.Gent@jbaconsulting.com>
Sent: 14 December 2020 13:53
To: Steve Wharton <steve.wharton@nwl.co.uk>
Cc: Heather Kerr <Heather.Kerr@jbaconsulting.com>
Subject: FW: 2020s0709: South Tees - EIA Consultation [2020s1483]

Dear Stephen,

Thank you very much for your time on the telephone a moment ago. I would just like to confirm the item below as discussed.

JBA were appointed back in June to undertake a high level assessment for water management for an EIA chapter for proposed development at a site within the South Tees Development Corporation (STDC) development site to support an outline planning application. As part of initial consultation we contacted yourself and your colleague at Northumbrian Water (emails in chain below) to enquire about initial guidance / advice on the proposal to inform outline planning permission. You kindly provided the advice in the email below.

JBA have subsequently been appointed to undertake 5 further EIA water management chapters for other 5 other proposed development sites with the STDC development site. The assessments are high level, as for the June assessment, since they are to support outline planning permissions for the sites. Details of these 5 sites are provided at the bottom of this email.

I would be grateful if you could by return of this email:-

- a) confirm that you are happy for us to re-use the advice provided and for us to note the following in our assessment:-

Blue green strategies need to be discussed with the Lead Local Flood Authority for this area as they are responsible for the governance on the management of surface water. In terms of ascertaining available capacity available in Northumbrian Water's network to accommodate flows from the proposed development, a request should be submitted to the Northumbrian Water Pre-Planning Enquiry Application

should be made which will incur a fee. It is anticipated that this will be undertaken by the team developing the Flood Risk and Surface Water Management Strategy for the site

- b) confirm if you are happy for a copy of this email chain (with names and the name section of email address redacted) to be included as an appendix to the EIA assessment.

If you would like any further details, please do not hesitate to contact me.
Thank you very much.

Kind regards,
Alice

Alice Gent

Senior Chartered Analyst | www.jbaconsulting.com | t:0131 319 2940

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DETAILS AND MAP OF THE FIVE PROPOSED DEVELOPMENT SITES:-

Lackenby

The proposed development site is located in the South Industrial Zone (SIZ - SIZ3) of the STDC area as part of the Lackenby development - hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 55389 21574. The site is 192ha (1,920,000m²) in size and comprises buildings and structures associated with the former SSI BOS and CONCAST steelworks and Tata Steel's vacant coil plate mill.

Long Acres

The proposed development site is located in the STDC area as part of the Teardrop Site and CLE31 – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 57432 24736. The site is 65.9ha (659,000m²) in size and is located at the River Tees estuary, approximately 1.5km north west of Redcar Town Centre.

Steel House

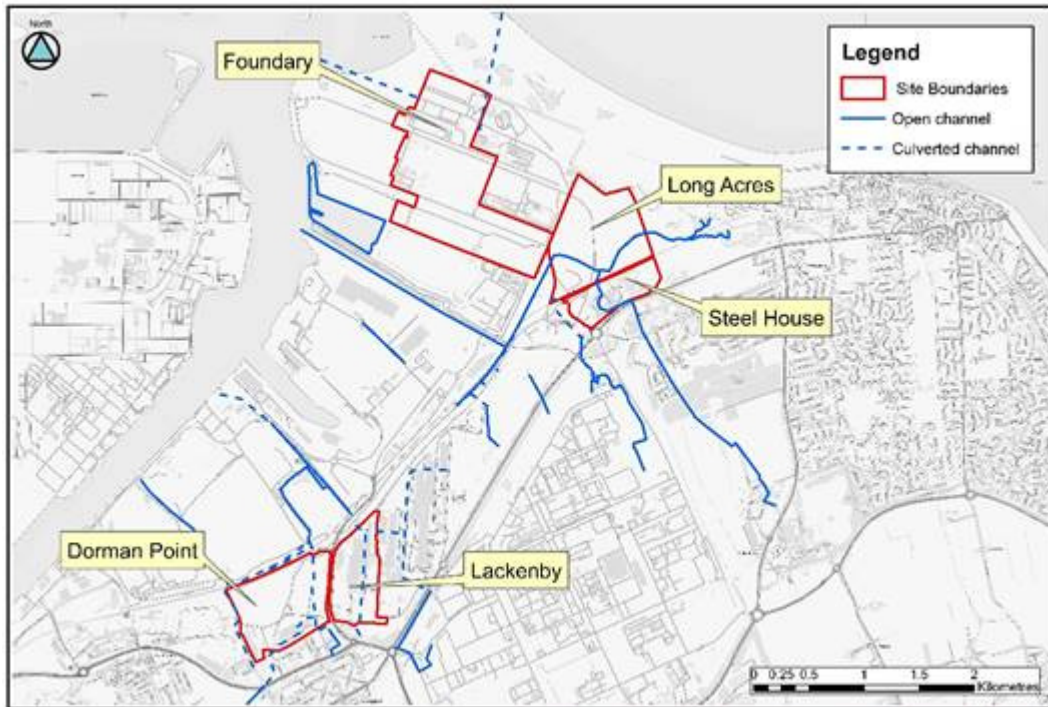
The proposed development site is located in the STDC area as part of the North East Industrial Zone (NEZ1) – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) 457709 524179. The site is 44.9ha (449,000m²) in size and comprises brownfield land at the River Tees estuary, located 5km to the west of Redcar. Current vehicular access to the site is from the south along the A1085 (Trunk Road).

Dorman Point

The proposed development site is located in the STDC area of Dorman Point (also known as Grangetown Prairie) – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 54753 21317. The site is part of the South Industrial Zone (SIZ – SIZ2) region of the proposed STDC area and is 57.8ha (587,000m²) in size and comprises brownfield land at the River Tees estuary, located 5km to the west of Redcar.

The Foundry

The proposed development site is located in the STDC area as part of the Redcar Works Complex – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 56195 25378. The site is 80.9ha (809,000m²) in size and is located at the River Tees estuary, approximately 3.2km to the west of Redcar.



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From: Steve Wharton <steve.wharton@nwl.co.uk>
Sent: 19 June 2020 13:49
To: Alice Gent <Alice.Gent@jbaconsulting.com>
Cc: Joy Kean <Joy.Kean@jbaconsulting.com>
Subject: RE: NWG Strategies - 2020s0709: South Tees - SIZ1 EIA Consultation

Afternoon Alice,

Peter has forwarded on your e-mail for me to provide you with a response.

With respect to the questions you have raised with regards Northumbrian Waters assets to accommodate development of this particular site, you will need to follow our pre planning enquiry service.

This is the link on our web site. <https://www.nwl.co.uk/services/developers/developer-sewerage-services/pre-planning-enquiries/>

In terms of blue green strategies, this is something that you need to take up with the Lead local flood authority for this area. The governance on the management of surface water sits with them.

If you need any further clarity then please feel free to just get in touch with me.

Thanks
Stephen

Stephen Wharton

Developer Services (Planning and Wastewater) Manager

☎ 0191 419 6617 | ☎ 36617

☎ 07713 987544 | ☎ 76718

✉ steve.wharton@nwl.co.uk

Leat House | Pattinson Road | Washington | NE38 8LB

NORTHUMBRIAN
WATER *living water*

From: Alice Gent [<mailto:Alice.Gent@jbaconsulting.com>]
Sent: 19 June 2020 10:54
To: 'peter.greenan@nwl.co.uk'
Cc: Joy Kean <Joy.Kean@jbaconsulting.com>
Subject: FW: 2020s0709: South Tees - SIZ1 EIA Consultation

Dear Peter,

Thank you for your time on the telephone a moment ago. As mentioned, we have been commissioned by Lichfields to undertake a high level assessment for water management for an EIA chapter for one of the sites (SIZ1) within the STDC development site.

Whilst the design for the site is yet to be developed, we would be grateful for Northumbrian Water's comments/policy position on blue green strategies, SUDS and process/considerations needed for ascertaining available capacity available in Northumbrian Water's network to accommodate flows from the development, as part of early engagement.

If you would like any further details, please do not hesitate to contact me.
Thank you.

Kind regards,
Alice

Alice Gent
Senior Chartered Analyst

JBA Consulting | www.jbaconsulting.com | t:0131 319 2940
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From: Joy Kean <Joy.Kean@jbaconsulting.com>
Sent: 09 June 2020 12:37
To: 'peter.greenan@nwl.co.uk' <peter.greenan@nwl.co.uk>
Cc: Alice Gent <Alice.Gent@jbaconsulting.com>
Subject: 2020s0709: South Tees EIA Consultation

Dear Peter,

We are writing to consult with Northumbrian Water regarding the proposal for the South Bank EIA. Lichfields have asked in one of their briefing notes that the chapter authors liaise with the various bodies:

The proposed development site is located in the STDC area at South Industrial Zone 1 (SIZ1) centred at Ordnance Survey National Grid Reference (OS NGR) 454181 522251. SIZ1 is 247ha in size and is a brownfield site at the River Tees estuary, located 5km to the west of Redcar. Vehicular access to the site is be from the south along the A1053 (Tees Dock Road) and the South Bank railway station is located outwith the south west corner of the site.



The Southbank project involves undertaking a high-level ES chapter on water management, flooding, and hydrogeology for an outline planning application. In a previous meeting (27th May 2020), JBA Consulting (as part of the STDC Strategy Study) consulted with Northumbrian Water to discuss potential options for flooding and surface water management for the whole site. This included discussing approval to remove structures, re-routing/ diverting watercourses, and implementation of SuDS measures. Please could you email to confirm that your thoughts are the same as previously discussed, and state if you have additional comments at this early stage.

Commentary is therefore required on the following area:

- Flow capacity - Northumbrian Water would need to confirm capacity is available in their network to accommodate flows from the development.

Kind regards,

Joy

Joy Kean

Graduate Analyst

Internal extension: 2836

COVID-19: During the current outbreak all JBA offices remain open and we continue to deliver our services. However, we have adopted flexible working with remote working in most cases.

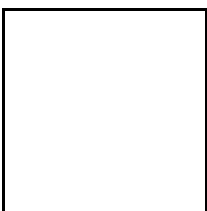
I remain contactable via email, Skype for Business, or email me to request my personal contact number.

JBA Consulting, Suite 2F, Ingram House, 227 Ingram Street, Glasgow, Scotland, G1 1DA. Telephone: +441413780730

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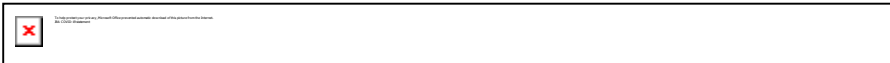
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www.nwl.co.uk



Alice Gent

From: Nigel Hill <Nigel.Hill@redcar-cleveland.gov.uk>
Sent: 24 November 2020 15:49
To: Alice Gent; Lyndsey Hall
Cc: Heather Kerr; Heather Overhead; 'asela.perera@mottmac.com'; Peter Greenan; Marshall, Phil; Rene Dobson
Subject: RE: RCBC Consultation - Teesworks [2020s1483]

Hi Alice

Yes happy with the approach you are taking as indicated in your email below. Unfortunately as the site is all in private land we don't have any additional records for this area and I am happy for you to use the information provided previously as required.

Thanks Nigel

From: Alice Gent <Alice.Gent@jbaconsulting.com>
Sent: 24 November 2020 09:57
To: Nigel Hill <Nigel.Hill@redcar-cleveland.gov.uk>; Lyndsey Hall <Lyndsey.Hall@redcar-cleveland.gov.uk>
Cc: Heather Kerr <Heather.Kerr@jbaconsulting.com>; Heather Overhead <heather.overhead@lichfields.uk>; 'asela.perera@mottmac.com' <asela.perera@mottmac.com>; Peter Greenan <Peter.Greenan@nwl.co.uk>; Marshall, Phil <phil.marshall@environment-agency.gov.uk>; Rene Dobson <Rene.Dobson@jbaconsulting.com>
Subject: RE: RCBC Consultation - Teesworks [2020s1483]

Dear Nigel,

Thank you for your email – I confirm that those general discussions were to talk about the potential improvements to the site rather than formal approval and that formal consideration of applications would be undertaken when submitted through the planning process.

At this pre-application stage when some details of the proposed developments at the 5 sites are yet to be finalised, we are keen confirm that our approach/recommendations of: locating buildings above the 1 in 200 year + climate change allowance still water level, improving the current drainage, incorporate consideration of climate change and adherence to local policy, is suitable and ascertain if RCBC would have any additional high level considerations that they would wish us to take.

Also, we would be grateful if you have any records of flooding at the 5 sites in addition to those which were kindly provided previously and if you could confirm that we can re-use these records of flooding in our description of flood history in our assessment of flooding at the five sites.

Thank you.

Kind regards,
Alice

Alice Gent

Senior Chartered Analyst | www.jbaconsulting.com | t:0131 319 2940

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From: Nigel Hill <Nigel.Hill@redcar-cleveland.gov.uk>
Sent: 24 November 2020 09:31
To: Alice Gent <Alice.Gent@jbaconsulting.com>; Lyndsey Hall <Lyndsey.Hall@redcar-cleveland.gov.uk>
Cc: Heather Kerr <Heather.Kerr@jbaconsulting.com>; Heather Overhead <heather.overhead@lichfields.uk>; 'asela.perera@mottmac.com' <asela.perera@mottmac.com>; Peter Greenan <Peter.Greenan@nwl.co.uk>; Marshall, Phil <phil.marshall@environment-agency.gov.uk>
Subject: RE: RCBC Consultation - Teesworks [2020s1483]

Hi Alice

All previous discussions were general open discussions regarding potential scope of improvements to the site and not formal approval regarding anything specific to the site as a whole.

We will be looking to work proactively with yourselves and any developers on the site and will consider all applications as they arise on an individual basis as and when they are submitted through the planning process.

Regards
Nigel

From: Alice Gent <Alice.Gent@jbaconsulting.com>
Sent: 23 November 2020 10:32
To: Lyndsey Hall <Lyndsey.Hall@redcar-cleveland.gov.uk>; Nigel Hill <Nigel.Hill@redcar-cleveland.gov.uk>
Cc: Heather Kerr <Heather.Kerr@jbaconsulting.com>; Heather Overhead <heather.overhead@lichfields.uk>
Subject: RCBC Consultation - Teesworks [2020s1483]

Dear Nigel/ Lyndsey,

We are writing to consult with Redcar and Cleveland Borough Council regarding the proposed development for the STDC Teesworks sites for which we are preparing the water management and drainage chapters for the Environmental Statements for the sites:

- Lackenby
- Long Acres
- Steel House
- Dorman Point; and
- The Foundry

Lichfields have asked in one of their briefing notes that the chapter authors liaise with the various bodies:

Lackenby

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Steel House

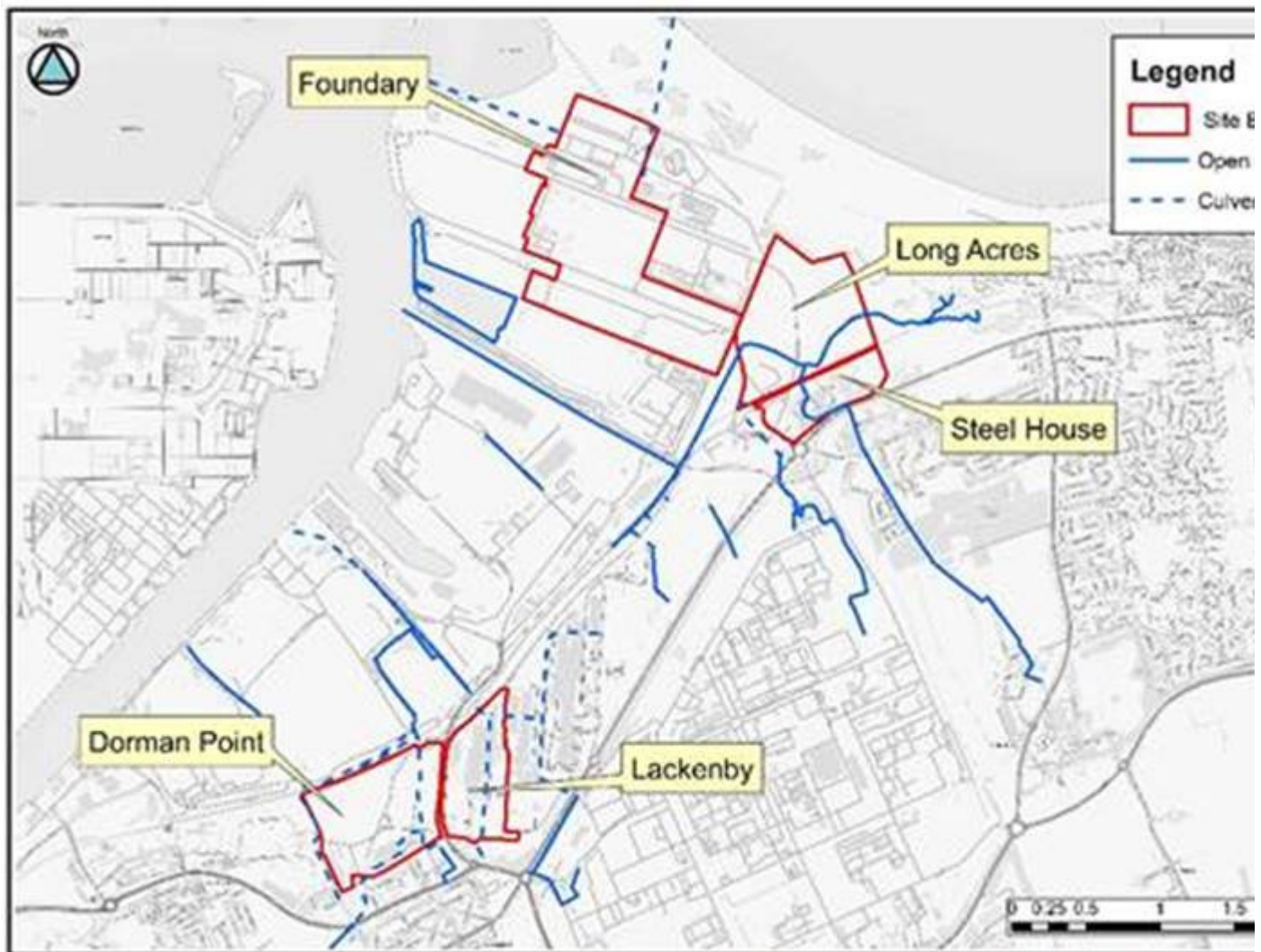
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The five projects involve undertaking high-level ES chapters on water management, flooding, and hydrogeology for an outline planning application.

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Commentary is therefore required on the following areas:

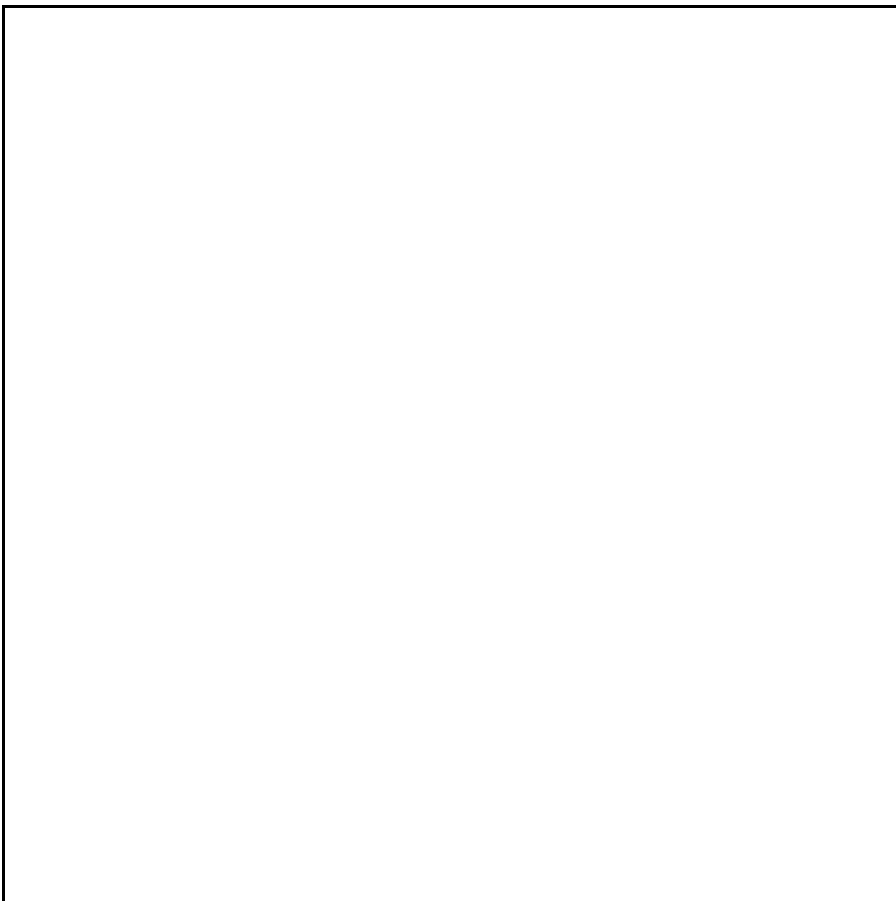
- Structure removal as part of the aspiration for a blue green network – proposal to improve the current situation but drainage proposals will be determined and included as part of the STDC strategy and further developed at design stage of the project.
- Flooding - land above 5.03m AOD (1 in 200 year + climate change allowance still water level) would be suitable for all types of development. The proposed platform level of 5.79m AOD is above the 1000 year plus climate change still water level and has a low probability of flood risk. A high-level site-specific FRA is being undertaken for the site.
- Local and National plans and policies - these have been considered
- Climate change – the Environmental Statement (ES) will consider the impact of climate change on water levels (as per the baseline assessment using government guidance). Need confirmation that wave overtopping and freeboard are not considered significant
- Water quality - It is assumed that all surface water runoff will require SuDS treatment and attenuation prior to discharge into the Tees or local watercourses. Pollution control measures advised in the water strategy, such as bunding of potential sources of contamination, will be implemented in order to prevent potential contamination incidents to the Tees. A WFD Assessment will be undertaken at a later stage of the project.

Kind regards,
Alice

Alice Gent

Senior Chartered Analyst | www.jbaconsulting.com | t:0131 319 2940

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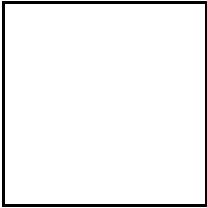


JBA Consulting, Unit 2.1, Quantum Court, Research Avenue South, Heriot Watt Research Park, Riccarton, Edinburgh, Scotland, EH14 4AP. Telephone: +441313192940

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Redcar & Cleveland Borough Council, Redcar & Cleveland House, Kirkleatham Street, Redcar, TS10 1RT, Tel: 01642 774 774, Website: www.redcar-cleveland.gov.uk



Heather Kerr

From: Newby, Caitlin <Caitlin.Newby@environment-agency.gov.uk>
Sent: 26 November 2020 13:15
To: Alice Gent
Cc: Heather Kerr; Heather Overhead
Subject: RE: 2020s1483: Environment Agency Planning Consultee Letter (Alice)
Attachments: EA Charged Request Form - 3e.docx; North East PO Template.pdf

Dear Alice,

Thank you for your email,

I'm afraid, the Environment Agency is not funded to undertake any work outside the statutory planning process. Therefore, if you require some site specific advice, this will be subject to charge. Charges for the Environment Agency's optional planning advice service is £100 per hour, per person (plus VAT). Further information regarding this service is available at <https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions> and <https://www.gov.uk/guidance/environment-agency-fees-and-charges#planning-applications-advice>

If you would like to proceed with our charged planning advice service, please complete and return the attached Charged Advice Form detailing the advice that you are seeking. We will use the information outlined in the form to determine the estimated costs and timescales for completing the work. Please note, we are currently at reduced capacity and have stopped and slowed the majority of non-statutory work. We may decide that we do not have the resources to carry out any pre-application work or, if we do, this may be at reduced timescales. We can review the information you send to determine this based on risk.

Otherwise, you can request a preliminary opinion from the EA. Please see here: <https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>. This opinion will advise you of the scope of information necessary to allow the EA to provide a substantial response to a subsequent planning permission and will provide you with some site-specific environmental constraints raised by the planning proposal.

As EIA proposals, the best option you will have on gaining more bespoke advice for the ES is to request a scoping opinion through the LPA. I understand with discussions with another consultant for these sites that likely is not an option due to timescales. You could also review recent applications in the area which we have responded to as this may also give you an indication of our likely stances.

In respect to flood records could you please contact northeast-newcastle@environment-agency.gov.uk and request this information.

Yours sincerely,

Caitlin Newby

Planning Adviser – Sustainable Places, North East

Environment Agency | Tyneside House, Skinnerburn Road, Newcastle, NE4 7AR

External: 020 771 40412 Mobile: 07341778674

caitlin.newby@environment-agency.gov.uk - planning.nane@environment-agency.gov.uk



From: Alice Gent [mailto:Alice.Gent@jbaconsulting.com]

Sent: 23 November 2020 10:45

To: NA NE, Planning <planning.nane@environment-agency.gov.uk>

Cc: Heather Kerr <Heather.Kerr@jbaconsulting.com>; Heather Overhead <heather.overhead@lichfields.uk>

Subject: FW: 2020s1483: Environment Agency Planning Consultee Letter (Alice)

Dear Sir / Madam,

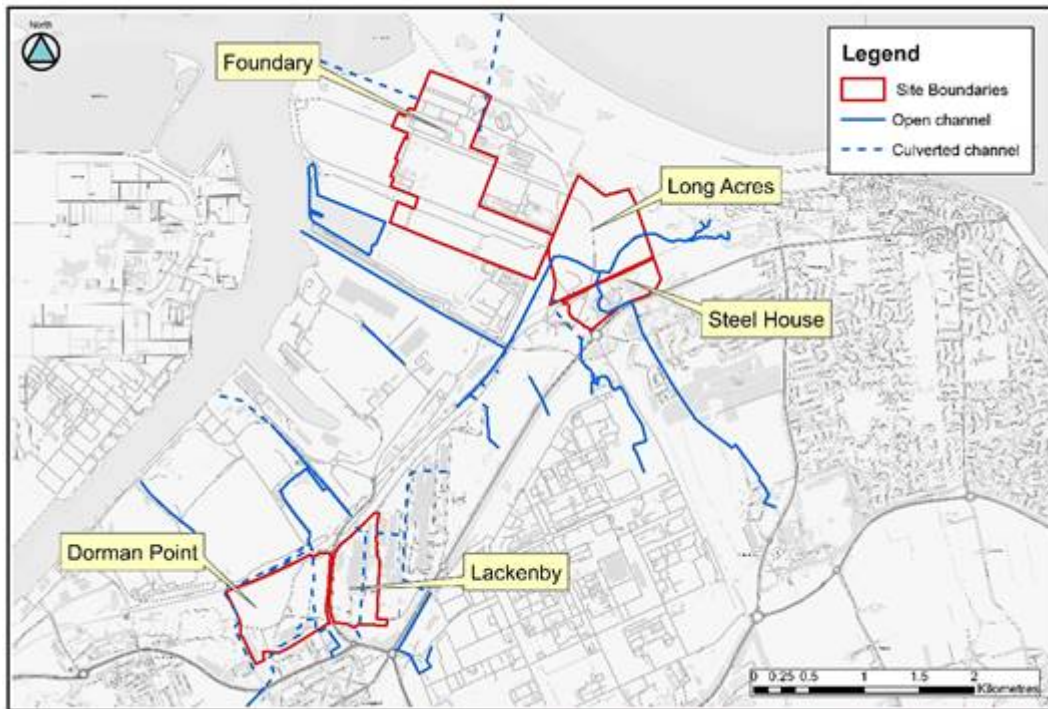
We are writing to consult with the Environment Agency Planning Department regarding 5 proposed developments at the South Tees Development Corporation site, for which we have been commissioned by Lichfield to undertake the water management and drainage assessment for each site for ES chapters,

The proposal and nature of the ES is high level for the purpose of achieving outline planning permission and so whilst additional consultation would be sought with the EA when further details are available, we would be grateful for your comments at this early stage on water management, flooding and hydrogeology

We would also be grateful for any flood records in the area with which you could provide us since the appendices to the ES chapters include a high level Flood Risk Assessment .

The five projects and further details are provided below:

- Lackenby
- Long Acres
- Steel House
- Dorman Point; and
- The Foundry



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Lackenby

The proposed development site is located in the South Industrial Zone (SIZ - SIZ3) of the STDC area as part of the Lackenby development - hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 55389 21574. The site is 192ha (1,920,000m²) in size and comprises buildings and structures associated with the former SSI BOS and CONCAST steelworks and Tata Steel’s vacant coil plate mill.

Long Acres

The proposed development site is located in the STDC area as part of the Teardrop Site and CLE31 – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 57432 24736. The

site is 65.9ha (659,000m²) in size and is located at the River Tees estuary, approximately 1.5km north west of Redcar Town Centre.

Steel House

The proposed development site is located in the STDC area as part of the North East Industrial Zone (NEZ1) – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) 457709 524179. The site is 44.9ha (449,000m²) in size and comprises brownfield land at the River Tees estuary, located 5km to the west of Redcar. Current vehicular access to the site is from the south along the A1085 (Trunk Road).

Dorman Point

The proposed development site is located in the STDC area of Dorman Point (also known as Grangetown Prairie) – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 54753 21317. The site is part of the South Industrial Zone (SIZ – SIZ2) region of the proposed STDC area and is 57.8ha (587,000m²) in size and comprises brownfield land at the River Tees estuary, located 5km to the west of Redcar.

The Foundry

The proposed development site is located in the STDC area as part of the Redcar Works Complex – hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 56195 25378. The site is 80.9ha (809,000m²) in size and is located at the River Tees estuary, approximately 3.2km to the west of Redcar.

Kind regards,
Alice

Alice Gent

Senior Chartered Analyst | www.jbaconsulting.com | t:0131 319 2940

COVID-19. JBA has remained open for business throughout the Coronavirus pandemic. However, by adopting more flexible working I may not always be available in the office but my direct contact number is 07724923960.



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SECTION 3

A checklist for the documents we need

Essential documents

We need the following in order to discuss how we might give you advice:

- A location plan** clearly showing the boundary of the proposed development. This should be at a scale between 1:100 and 1:2500 and should show any watercourses or water bodies within your development site
- An indicative layout plan** of the proposed works, including all proposed access roads, buildings and other structures together with any site formation and temporary works that you propose to carry out
- A plan of any other development or works** that you may carry out, or request others to carry out, in order for you to construct and/or to operate your proposed development

Documents on which you may want our advice may include:

- A draft environmental statement** where required by EIA Regulations (please note that we need to know the complete scope of your proposed environmental statement)
- A flood risk assessment** – see our standing advice on proposed development in flood risk areas
- A report on potential impacts on a water body in a River Basin Management Plan** including works in a main river and proposed eel and fish passes
- A preliminary risk assessment for impacts of land contamination** including the risk of polluting surface water and ground water
- An assessment of impacts on a wetland site designated under the Habitats or Wild Birds Directive** where those impacts may concern us

Please list below any other documents you want our advice on:



Planning advice for developers – FAQs

INTRODUCTION

Local planning authorities (LPAs) across the North East are required to consult us on [certain planning applications](#) which affect flood risk, groundwater, waste, or water quality.

If your development falls into one of these categories, we'll be invited to comment on your planning application. Your LPA, when considering your application, will take our comments into account.

We've produced this guidance to summarise the environmental issues we're responsible for. The guidance forms part of our free advice service; if you require site-specific or face-to-face advice, we'll need to recover our costs through our [charged advice service](#). Engaging with us early can help you identify the big issues, reduce the chances of subsequent delays and help you design a more sustainable and attractive development.

DEVELOPMENT AND FLOOD RISK

Is my development proposal at risk of flooding?

The [flood map for planning](#) shows where flooding from rivers and the sea may occur. Whilst this map isn't suitable for a detailed flood risk assessment, it'll show which [flood zone](#) your development is located within and therefore will indicate whether further assessment is needed. You should also refer to your LPA's [strategic flood risk assessment](#) which will provide additional local information on flood risk, including the location of functional floodplain and areas which are susceptible to other sources of flooding such as from surface water or reservoirs.

Will my application need to pass the sequential and exception tests?

Local planning authorities apply the [sequential test](#) to steer development towards areas at the lowest risk of flooding. If your proposal is located within flood zones 2 or 3, you should contact your LPA to discuss the sequential test **before** submitting your application. The LPA may require you to submit information with your application in support of the sequential test.

If the LPA confirm that the sequential test has ruled out steering the development to lower risk sites, the development may also need to pass the [exception test](#) by demonstrating that its sustainability benefits outweigh flood risk and that it can be made safe for its lifetime, through the production of a site-specific flood risk assessment. [Planning practice guidance](#) advises when an exception test will be required, which will depend on the [vulnerability of the development](#) and the flood zone it lies within.

Do I need to submit a flood risk assessment with my planning application?

You'll need to submit a flood risk assessment if your application lies within flood zones 2 or 3 or is over 1 hectare within flood zone 1. You'll also need to submit an assessment if your proposal could be affected by sources of flooding other than from rivers or the sea. For certain lower risk applications, we've provided '[flood risk standing advice](#)' which enables local planning authorities to assess flood risk assessments without the need to consult us.

What information should I include in my flood risk assessment?

We recommend that you refer to the checklist for a [site-specific flood risk assessment](#) for detailed advice on what to include in your flood risk assessment. Alongside referring to your LPA's strategic flood risk assessment, you should contact your LPA to find out whether there are any development guidelines which are specific to your locality.

Can I undertake my own flood risk assessment?

Your FRA must be appropriate to the scale, nature and location of the development whilst being credible and fit-for-purpose. Whilst it's possible to undertake your own assessment, most applicants employ suitably experienced professionals. We're not able to recommend specific consultants, but a simple web search should help you source a competent individual or company.

Do I need to consider how climate change will affect my proposal's flood risk?

Yes, you should demonstrate how flood risk will be managed now and over the development's lifetime, taking climate change into account. Please refer to the following [guidance](#) when undertaking your flood risk assessment. In some cases we'll hold the climate change flood data you need. In others you'll need to undertake your own analysis to understand the impacts.

Where can I get modelled or historic flood levels from?

Email our Customers and Engagement team (northeast-newcastle@environment-agency.gov.uk) to find out whether we have any modelled or historic flood levels available for your development site. A list of the packages of information we're able to provide can be found under the 'get information to complete an assessment' section of the [planning practice guidance](#). They'll aim to provide this information within 20 days. We no longer charge for providing this information.

The risk portrayed by your flood map doesn't seem to reflect the site's actual risk. How do I 'challenge' your flood map?

If you have evidence suggesting that our flood map is inaccurate, please contact our Customers and Engagement team (northeast-newcastle@environment-agency.gov.uk) who will provide you with any existing data we hold. To formally contest our flood zones, you'll need to submit supporting evidence, such as digital copies of a topographic survey or modelling for quality assurance purposes. Digital files of the proposed new flood zones in ArcMap or MapInfo format should also be supplied. Any new outline data you submit must conform to our flood zones policy, copies of which are available on request.

Whilst we'll usually be happy to review any topographical survey or model prior to the application being submitted, we would have to recover our costs for this work. In some cases where work to review and update our existing models is already underway, we may decline to consider a challenge.

As we have to be certain that the data which informs our flood map is fit-for-purpose, any revisions will need to meet stringent quality checks.

SURFACE WATER AND DRAINAGE

Who's responsible for managing surface water?

[Lead local flood authorities](#) are responsible for providing advice on the management of surface water resulting from new [major](#) development. [Internal drainage boards](#), were established, have permissive powers to manage water levels within their drainage districts, so also play a key role in managing surface water.

Will I need to provide surface water storage and limit the discharge rate?

You should contact your lead local flood authority to discuss surface water discharge rates and storage requirements. Typically, they'll ask that your development does not increase run-off and limits the discharge to the existing greenfield run-off rate (usually 1.4l/s/ha if not calculated).

Do I need to install sustainable drainage systems?

[Sustainable Drainage Systems \(SuDS\)](#) should always be carefully considered in discussion with your lead local flood authority. A SuDS scheme can reduce flood risk, improve water quality, create better habitats for wildlife, and produce pleasant, more amenable places for people.

Infiltration drainage must not, however, pose a risk to groundwater quality. All infiltration SuDS must:

- Meet the groundwater protection criteria set out on [GOV.UK](https://www.gov.uk)
- Not be constructed in ground affected by contamination

Who should I contact about connecting my development to the mains sewer?

Talk to your water company about connecting to their sewerage system. Here are some contact details for water companies operating in the North East Environment Agency area:

Northumbrian Water developmentenquiries@nwl.co.uk

My development is a long way from the mains sewer. Can I install a 'non-mains' drainage system, such as a package treatment plant?

New development should connect to the public mains sewer wherever possible. Individual treatment plants can deteriorate local water quality and are more challenging to monitor and regulate. If you can't connect to the mains sewer, your planning submission should outline how you will deal with foul drainage discharge. You should include evidence as to why it is not possible to connect to the mains system, including details of any prohibitive costs. Please

note that some 'non-mains' foul water drainage systems will require an environmental permit, irrespective of any planning approval.

OTHER ENVIRONMENTAL CONSIDERATIONS

What other environmental issues will you consider with my planning application?

Your planning application will need to demonstrate that any environmental risks can be managed, through design and construction, for the development's lifetime. Alongside flood risk, the key environmental risks we'll consider are:

- [**Land contamination**](#)
We're mainly interested in those sites where there is a risk of pollution to controlled waters. You should investigate any contamination to see whether the environmental risk or cost of clean-up (remediation) would hinder your proposal. If contamination is known or suspected, a desktop study, investigation, remediation and other works may be required to enable safe development. Our [model procedures for the management of land contamination](#) provide further information.
- [**Pollution prevention**](#)
Your application should demonstrate how you'll minimise the risk of pollution from all aspects of your development, including construction and

operation phases. Groundwater can be vulnerable to pollution, as well as rivers and streams. Some areas (source protection zones and aquifers) are especially sensitive to pollutants as they typically supply public drinking water. To find out whether your development is located in an area sensitive to groundwater pollution, visit our interactive [maps](#). Advice on groundwater protection can be found on [GOV.UK](#)

- **Fisheries, biodiversity, geomorphology and protected species**

If your proposal is likely to affect the ecology of a main river, you'll need to carry out a risk assessment. This assessment should show that your development can proceed without demonstrable harm, and should propose mitigation, compensation or enhancements where required. A survey should be carried out if any protected species are thought to be nearby. If this survey confirms the presence of protected species or their habitat, measures should be taken to manage the development's risks. Natural England are the statutory consultee for other biodiversity-related matters. Further information on their remit can be found on [GOV.UK](#)

- **Water framework directive**

If your proposal affects ground or surface waterbodies, you'll need to consider the [Water Framework Directive](#) (WFD) and the actions set out in the [Northumbria River Basin Management Plan](#). You'll also need to submit a [WFD Assessment](#) demonstrating how the development will prevent deterioration and improve the waterbody's ecological status.

- **River buffer zone**

Your development should ensure that an 8m strip of land (planted with locally appropriate, native species) is left undisturbed next to the bank of any main river. This 'river corridor' will improve habitat connectivity and will ensure we're able to access the bank for any future flood defence construction and maintenance.

- **Culverting**

We're opposed to culverting. Culverts degrade watercourses' ecology and prevent the movement of wildlife and fish. As culverts can easily become blocked, they increase flood risk. They're also difficult to inspect and maintain. We may object to any planning applications involving culverting on a main river and may refuse to grant an environmental permit. Existing culverts should be removed and the river channel and bankside habitat reinstated to restore the ecological continuity of the river channel and its corridor.

Will I need any other Environment Agency permits for my development?

You might need an environmental permit if your development manages or produces waste or emissions that pollute the air, water or land or is work that affects a [main river](#) or a sea defence. The lead local flood authority is responsible for any consents relating to ordinary watercourses.

The [Environmental Permitting Regulations \(England and Wales\) 2015](#) cover water discharges, groundwater activities, flood risk activities, radioactive substances, waste, mining waste and installations. They also include provision for a number of directives including batteries. Further information, including contact details for further permitting related enquiries, can be found [here](#).

As planning and permitting decisions are often closely linked, we have issued detailed [guidance for developments requiring planning permission and environmental permits](#). This guidance explains how, when responding to planning consultations that require environmental permits, we will advise of three possible positions:

- No major permitting concerns
- More detailed consideration is required and parallel tracking is recommended
- Don't proceed – unlikely to grant a permit.

PRE-APPLICATION ADVICE

Can you provide site-specific advice, review a submission document, or attend a site meeting before I submit my planning application?

We encourage you to seek pre-application advice as it can help you solve key environmental issues early, reduce the chance of an objection and help you design a more sustainable development. If you'd like to take advantage of this service, please email our Sustainable Places team so that we can provide further details and estimated costs.

Please note that any pre-application guidance we provide doesn't represent our final view in relation to any future planning application. We recommend that you seek your own expert advice prior to submitting your application.

Who should I contact for further information?

North East planning enquiries: planning.nane@environment-agency.gov.uk

General enquiries: 03708 506 506

Tyneside House Skinnerburn Road Newcastle Business Park Newcastle upon Tyne NE4 7AR

<https://www.gov.uk/government/organisations/environment-agency>

Appendix F2: Flood Risk Assessment

Lackenby Flood Risk Assessment

Final Report

December 2020

www.jbaconsulting.com



South Tees Development Company

Teeside Management Offices

REDCAR

TS10 5QW

JBA Project Manager

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Revision History

Revision Ref/Date	Amendments	Issued to
P01 / 20 November 2020	Draft report	John McNicholas and Lichfield
P02 / 14 December 2020	Marked as final	John McNicholas and Lichfield

Contract

This report describes work commissioned by John McNicholas, on behalf of South Tees Site Company, by an email dated 30 October 2020. South Tees Site Company’s representative for the contract was John McNicholas of South Tees Site Company. Alice Gent, Heather Kerr and René Dobson of JBA Consulting carried out this work.

Prepared by Alice Gent BSc MCIWEM C.WEM CEnv

Chartered Senior Analyst

..... Heather Kerr BSc (Hons) MSc

Assistant Analyst

Reviewed by René Dobson BEng CEng MICE

Associate Director

Purpose

This document has been prepared as a Final Report for South Tees Site Company. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to South Tees Site Company.

Acknowledgements

JBA wishes to thank Redcar and Cleveland Council and the Environment Agency for supply for flood history records.

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Abbreviations

AEP	Annual Exceedance Probability
ALTBAR	Mean catchment altitude (m above sea level)
ASCII	American standard character set for information interchange
BFIHOST	Base Flow Index estimated from soil type
BGS	British Geological Survey
DEFRA	Department of the Environment, Food and Rural Affairs (formerly MAFF)
DPLBAR	Index describing catchment size and drainage path configuration
DPSBAR	FEH index of mean drainage path slope
DTM	Digital Terrain Model
EA	Environment Agency
EIA	Environmental Impact Assessment
FARL	FEH index of flood attenuation due to reservoirs and lakes
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
LiDAR	Light Detection And Ranging
mAOD	metres Above Ordnance Datum
NGR	National Grid Reference
NPPF	National Planning Policy Framework
OS	Ordnance Survey
OS NGR	Ordnance Survey National Grid Reference
PDF	Portable Document Format
PPG	Planning Policy Guidance
PROPWET	FEH index of proportion of time that soil is wet
Ramsar	The intergovernmental Convention on Wetlands, signed in Ramsar, Iran, in 1971
SAAR	Standard Average Annual Rainfall (mm)
SFRA	Strategic Flood Risk Assessment
SPRHOST	Standard percentage runoff estimated from soil type
SSSI	Site of Special Scientific Interest

Definitions

FARL	Flood Attenuation by Reservoirs or Lakes. This provides a guide to the degree of flood attenuation by reservoirs or lakes in the catchment which will have effect on flood response. A value of 1 indicates no attenuation, whereas 0.8 and under indicates substantial attenuation.
------	--

1 Introduction

1.1 Scope of Works

The South Tees Development Corporation (STDC) commissioned JBA Consulting in October 2020 to prepare the Water Management and Flooding chapter of the Environmental Impact Assessment (EIA) for the outline planning application for the Lackenby site within the STDC area, near Redcar. The chapter will comprise an assessment of water management and flooding, as well as examining drainage and hydrogeology.

This Flood Risk Assessment (FRA) study has been undertaken for Lackenby to provide details that inform the Water Management and Flooding chapter. The study is necessary to meet the requirements of the National Planning Policy Framework¹ (NPPF) and to support the outline planning application in relation to assessing flood risk.

This FRA will comprise the following:

- Data review – including:
 - request for flood records from Redcar and Cleveland Council and the Environment Agency
 - Review of Phase 1 Data Collection and Baseline Assessment report for the wider STDC development
- Review of baseline risk for water management and flooding and assess the impacts of the proposed development
- Discuss flood, surface water and groundwater receptors and identify appropriate mitigation and enhancement measures
- Assess impacts of proposed development

1.2 Reporting Guidelines and Legislation Context

This Flood Risk Assessment (FRA) is consistent with the reporting requirements detailed within the National Planning Policy Framework (NPPF).

The aim of this FRA is to present relevant information pertaining to flooding in a clear format that can be reviewed by the Planning Authority and the Environment Agency. It does not guarantee that the proposed development will be acceptable to the Planning Authority and the Environment Agency in terms of flood risk and water management.

1 NPPF <https://www.gov.uk/government/publications/national-planning-policy-framework--2> [accessed 25 May 2020]

2 Flood Risk Assessment

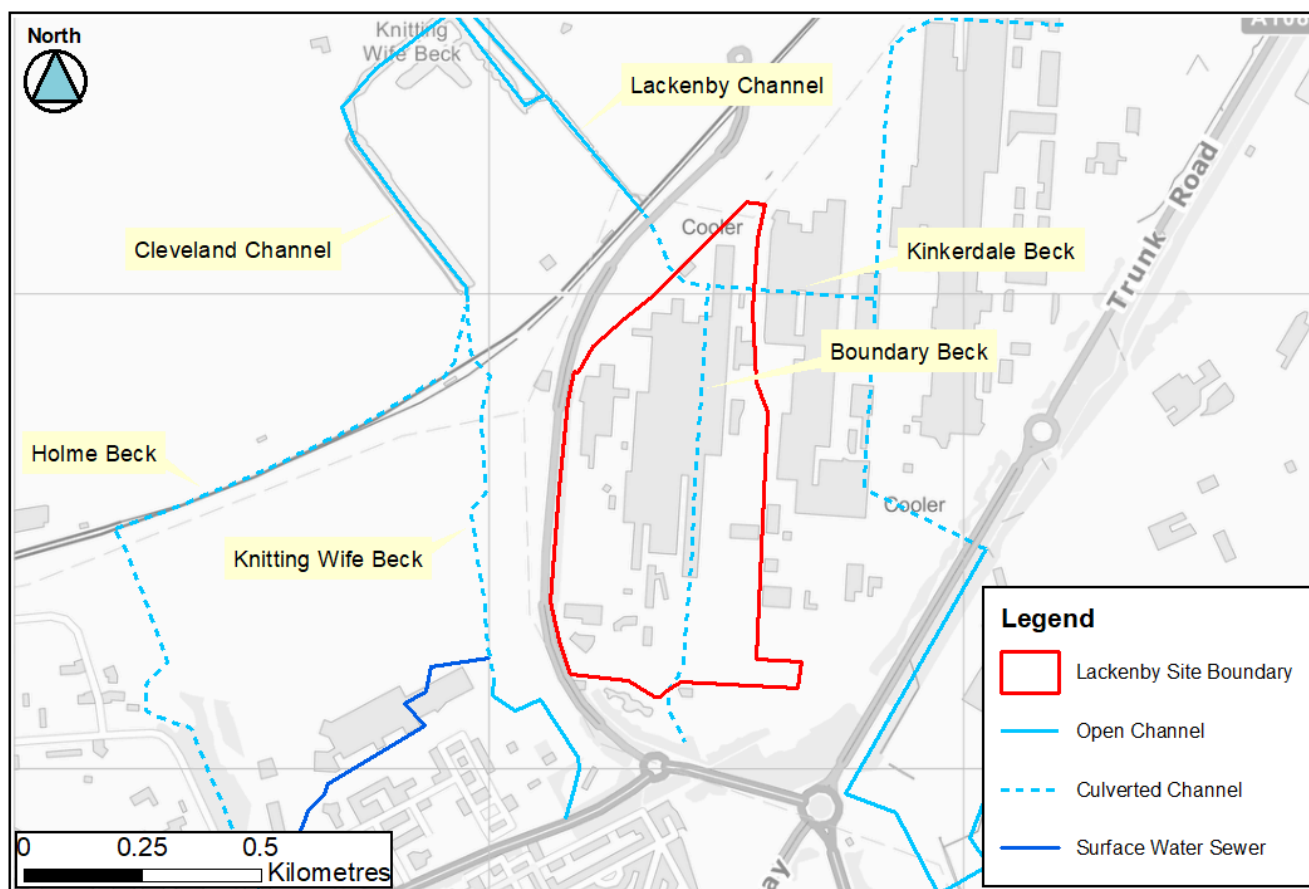
2.1 Site Details and Location

The proposed development site is located in the South Industrial Zone (SIZ - SIZ3) of the STDC area as part of the Lackenby development - hereafter referred to as the site – and is centred at Ordnance Survey National Grid Reference (OS NGR) NZ 55389 21574. The site is 192ha (1,920,000m²) in size and comprises buildings and structures associated with the former SSI BOS and CONCAST steelworks and Tata Steel's vacant coil plate mill. The site has an area of scrub type vegetation in the north eastern corner however it is mostly occupied by buildings and structures such as tanks, chimneys, pipes and conveyors. There is also a redundant railway line to the south-west and northern parts of the site. The site was open fields up until the mid 1950s when it was developed for steelmaking. Vehicular access to the site will be by a new spur created at the A66 / Tees Dock Road / A1053 roundabout.

2.1.1 Catchment Hydrology

The site lies within the catchment of the River Tees that lies adjacent approximately 2km north east of the site. It is also within the catchments of one waterbody – the Lackenby Channel, into which the culverted Boundary Beck and Kinkerdale Beck drain. The Lackenby Channel discharges into the River Tees via the Lackenby outfall. Topographic survey data provided by Lichfield shows the elevations at the site mostly range between 9mAOD to 11mAOD. There are a cluster of high elevation regions to the south east of the site which are a legacy of the previous steelworks which are approximately 1m above surrounding ground levels. The main watercourse through the site is the Boundary Beck culvert. To the north of the site, the Boundary Beck joins with the Kinkerdale culvert converge and flow into the Lackenby Channel north of the site in an area associated with iron and steel production. In the Lackenby Channel downstream of the confluence with the Cleveland Channel there is an in-channel structure assumed to act as a tidal weir. Beyond the weir the Lackenby Channel is a deep large open channel that drains to a culvert of unknown dimension which conveys flows below Teesport to an outfall on the River Tees.

Site features described above are shown in the figure below.



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Source: EPB -JBAU-00-LA-M2-EN-0013-Lackenby_Site_Map_P02

Figure 2-1: Map showing watercourses on site

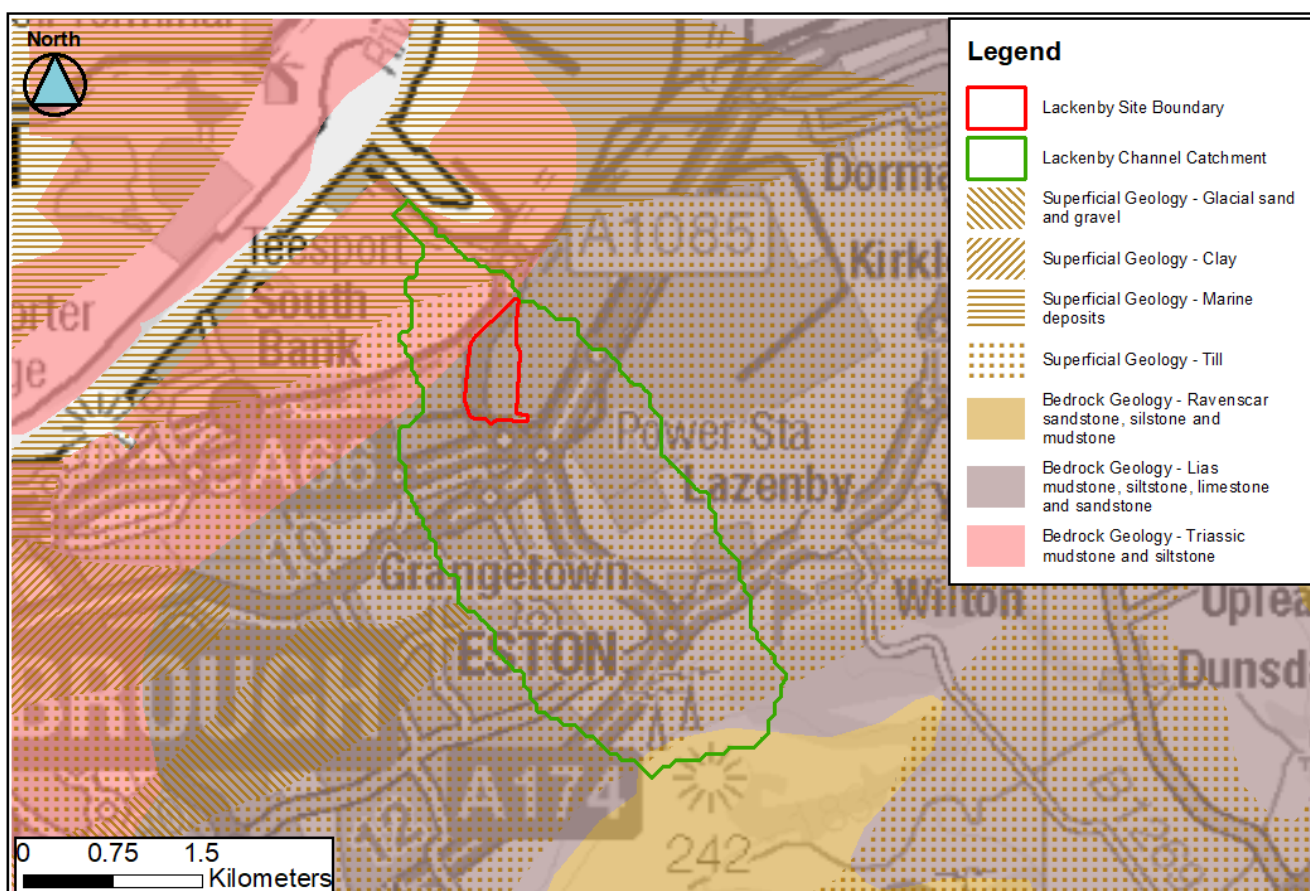
The hydrological catchment of the Boundary Beck down to NZ 55222 21911 has an area of approximately 7.5km². The larger Lackenby Channel catchment, which encompasses the Boundary Beck, down to NZ 54600 22950 has an area of approximately 8.3km². The catchment drains from the south-east to the north-west. It rises on Eston Moor to the south east of the site at elevations of 240mAOD and drains north west, declining to an elevation of approximately 50 mAOD at the site. The FARL value of 0.844 for the catchment indicates there is capacity for water storage within the catchment, this includes the reservoirs either side of the A174 and the open Cleveland Channel that runs parallel to the Lackenby Channel north west of the development site. The catchment is shown in Figure 2-2.

The British Geological Survey² online viewer indicates the underlying bedrock geology is Triassic Rock which comprises of sandstone, siltstone and mudstone. The superficial geology is raised Marine deposits, comprising of sand and gravel.

² <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Table 2-1: Catchment descriptors for the catchment draining to the site.

Catchment Descriptor	Lackenby Channel catchment
AREA (km ²)	8.3
ALTBAR (m above sea level)	34
BFIHOST	0.375
BFIHOST19	0.390
DPLBAR (km)	3.51
DPSBAR (m/km)	44.2
FARL	0.844
PROPWET	0.31
SAAR (mm)	619
SAAR4170 (mm)	620
SPRHOST (%)	36.96
URBEXT1990	0.4307
URBEXT2000	0.4573



Source: EPB -JBAU-00-LA-M2-EN-0002-Lackenby_Geology_Map

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Figure 2-2: Map showing the hydrological catchments and geology at the site

2.1.2 Designations Within or in Proximity to the Site

A search for designations within or within 2km of the site has been completed using the Defra MAGIC portal³. Teesmouth and Cleveland Coast SSSI extends across the whole of the River Tees estuary and lies c. 1.7km north west of the site. This is in place to protect the coastal and freshwater habitats on the estuary. This includes areas of Jurassic and quaternary geology, notably the Redcar Rocks in the area of the site. Sand dunes, saltmarshes, mudflats, rocky and sandy shores, saline lagoons, grazing marshes, reedbeds and freshwater wetlands provide habitats for breeding and non-breeding birds as well as assemblage for invertebrates. The coastal habitat provides breeding areas for harbour seals. The site is located within the SSSI impact risk zone which requires planning applications to be assessed for likely impacts on the SSSI.

Located on the opposite side of the Tees Estuary approximately 2km north west of the site is a designated Ramsar site for the mudflats which provide a breeding ground for wetland birds. Considerations for this will be the same as those for the SSSI impact risk zone. Due to the distance from the site, the proposed development is not anticipated to have any impact on this designated site. Approximately 1km to the south of the site is the Groundwork North East area of community forest.

2.1.3 Historical and Existing Land Use

Currently the Lackenby site houses several buildings and structures from the former SSI BOS and CONCAST steelmaking facilities and former Tata Steel’s vacant coil plate mill. Up until the mid 1950s, the land lay as open fields.

Most of the site is covered with buildings or structures associated with the steel production, however there is a small area of scrub-type vegetation to the northern corner and south eastern area of the site. Although most of the buildings on the site are large industrial warehouse type buildings there are also a number of small brick buildings as well as tanks, chimneys, pipes and conveyors.

There are a number of mounds to the south of the site associated with former use as well as a redundant railway line which runs along the south western and northern regions of the site. The former Hot Metal Transfer Railway runs across the southern part of the site. To the north, the major operators freight rail line has spurs entering the site, one of these extending a significant way into the site. There is also an electricity pylon in the northern corner and an electricity substation just outside the southern boundary as well as a power transmission line under the southern part of the site. The topography of the site is generally flat apart from the small mounds to the south and west of the site associated with previous steelmaking facilities.

2.2 Proposed Development

The proposed outline development is for a general Use Class B2 and B8 development of an area of almost 93,000m². These are classed as general industry and storage or distribution facilities respectively together with ancillary office accommodation, HGV and car parking and associated works including works to watercourse, potentially involving their realignment. The initial development parameters have been developed by the client and are specified in Table 2-2.

Table 2-2: Initial development parameters

Development Parameter	Amount/use
Use Class	B2 (General industry) B8 (Storage or Distribution) E (Office) (maximum 10% of overall floorspace)

³ <https://magic.defra.gov.uk/MagicMap.aspx>

Maximum Floorspace	1m sqft / circa 92,903 sqm
Maximum Development Height	46m
Finished Floor Level	Minimum of 10.00 mAOD
Maximum Building Height	36m
Access	Access is reserved and details will be submitted at the Reserved Matter stage of the planning process. An indicative location is shown on the Parameters Plan.

The proposed development is being submitted as an outline planning application to Redcar and Cleveland Borough Council.

2.3 Sources of Flood Risk

There are a number of potential sources of flooding that could impact any site; these are fluvial (originating from a watercourse), coastal, groundwater, surface water (pluvial), sewers and blocked culverts and infrastructure failure. The purpose of this report is to provide an assessment of flood risk to the site from these sources.

Within England, the Flood Risk and Coastal Change Planning Practice Guidance (FRCC-PPG)⁴ sits alongside the NPPF and sets out detailed guidance on how this policy should be implemented. It has a three stage approach: assess flood risk, avoid flood risk and manage / mitigate flood risk.

The flood probabilities used to describe Flood Zones as defined in the FRCC-PPG are noted below:

Flood Zone	Annual Probability of Flooding
1	This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%).
2	This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year
3a	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
3b	This zone comprises land where water has to flow or be stored in times of flood. This includes land that would flood with an annual probability of 1 in 20 (5%) or 1 in 25 (4%) or greater in any year, or is designed to flood in an extreme (0.1%) flood. Also referred to as functional floodplain.

As part of the avoidance of flood risk, the Sequential Test is applied which entails steering the development to a location which is in Flood Zone 1 (areas with a low probability of river or sea flooding). If the proposed development is located within Flood Zone 2 then the Exception Test is applied which requires demonstration that the proposed development will a) 'provide wider sustainability benefits to the community that outweigh flood risk and b) that the proposed development will 'be safe for its lifetime without increasing flood risk elsewhere and where possible reduce flood risk overall'.

2.3.1 Fluvial and Coastal Flooding

⁴ Flood risk and coastal change <https://www.gov.uk/guidance/flood-risk-and-coastal-change> [accessed 25 May 2020]

The EA flood map for planning⁵, in Figure 2-3, shows the combined flood extents from rivers and the sea at the site. The site is entirely in Flood Zone 1, meaning it has a less than 1 in 1000-year annual probability of flooding from river or sea. The flood extents for this mapping are created using coarse scale UK wide fluvial modelling, and incorporates more detailed modelling of specific rivers done for the EA. The watercourses through the site are too small to be included in the coarse modelling and will not have previously been modelled by the EA so any fluvial flooding from these will not be captured in this mapping.

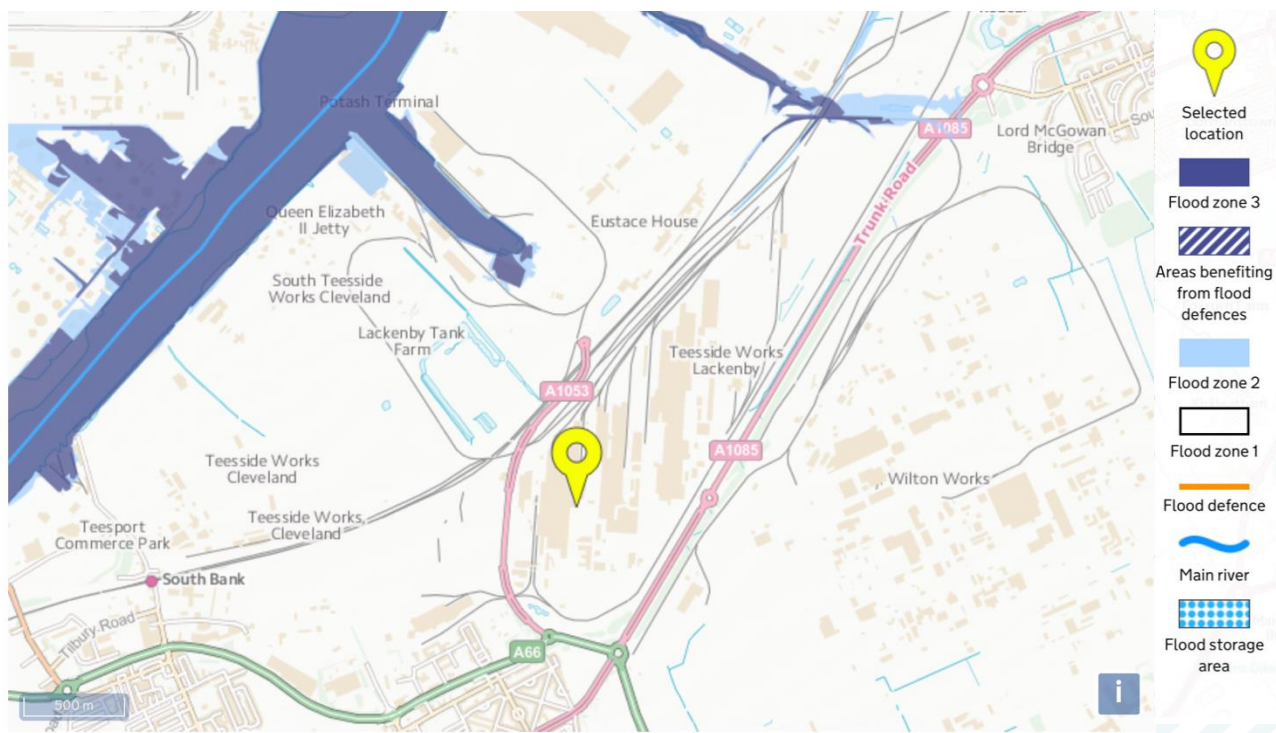


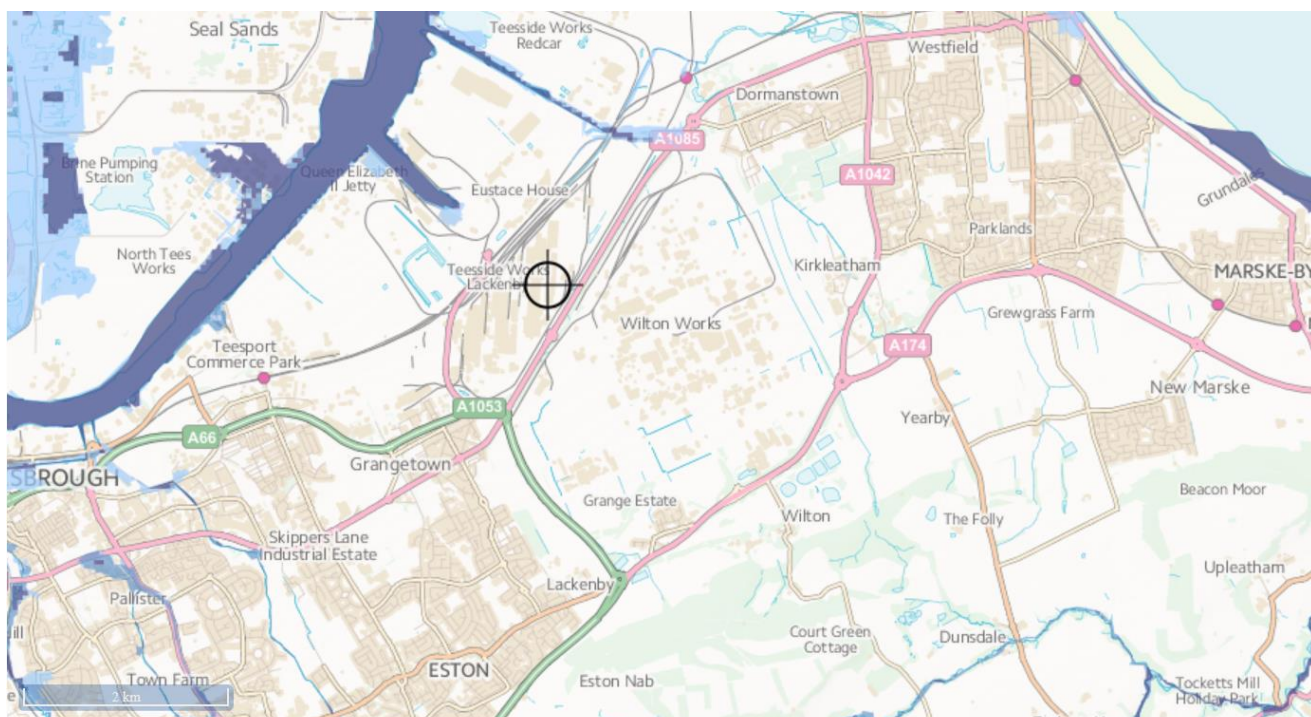
Figure 2-3: Extract from Environment Agency flood map for planning at the site

The EA flood maps combine the risk of flooding from river and seas. The EA flood warning information service long term flood risk map shows the risk split into very low, low, medium and high risk categories:

- Very low risk – less than 1 in 1000-year probability
- Low risk – Between 1 in 1000 and 1 in 100-year probability
- Medium risk – Between 1 in 100 and 1 in 30-year probability
- High risk – Greater than 1 in 30-year probability.

Figure 2-4 shows the development site is in an area of very low risk.

⁵ Environment Agency Flood map for planning. <https://flood-map-for-planning.service.gov.uk/confirm-location?eastings=460152&northing=525139&placeOrPostcode=redcar> [Accessed 26 May 2020]



Extent of flooding from rivers or the sea

● High
 ● Medium
 ● Low
 ● Very low
 ⊕ Location you selected

Figure 2-4: Extract from EA map of long term flood risk flood extent from rivers or the sea⁶

2.3.1.1 Climate Change - Fluvial

NPPF notes that there should be a “proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk”.

Peak river flow allowances show the anticipated changes to peak flow by river basin district. Redcar is located within the Northumbria river basin district. The application of allowance category is subject to the Flood Risk Vulnerability Classification (categorises development, considering whether it relates to essential infrastructure or, for example development for vulnerable groups in society e.g. hospitals / care homes) and the Flood Zone in which the site lies.

⁶ EA flood warning information service map of long term flood risk. <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=453987&northing=522641&address=10034526609&map=RiversOrSea> [Accessed 26/05/2020]

Table 2-3: EA Peak flow allowances, Northumbrian River Basin District (use 1961 to 1990 baseline)⁷

Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	20%	30%	50%
Higher central	15%	20%	25%
Central	10%	15%	20%

2.3.1.2 Climate Change – Sea Level

There are a range of allowances for each epoch for sea level rise in Northumbria shown in Table 2-4 derived from EA Table 3.

Table 2-4: EA Sea level allowance for each epoch for Northumbria⁸

Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Higher central	4.6 (161)	7.5 (225)	10.1 (303)	11.2 (236)	1.03
Upper end	5.8 (203)	10 (300)	14.3 (429)	16.5 (495)	1.43

Since the original Tees tidal model was developed in 2011/2013 and the above table was published, JBA have undertaken an update to the Tees coastal model on behalf of the EA as part of a separate project in 2019/2020 for Port Clarence / Greatham. The update to the model was based on the UKCP18 uplift values utilising 2017 for a base year for extreme sea levels. Table 2-5 below summarises the results of the updated modelling on the uplift (mm) per epoch.

Table 2-5: Tees Tidal UKCP18 Tees Tidal Uplift Value

Uplift	Epoch	Updated uplift value (mm)
Present day uplift	2017-2019	0.011
UKCP18 2030 uplift	2019-2030	0.071
UKCP18 2050 uplift	2019-2050	0.249
UKCP18 2070 uplift	2019-2070	0.488
UKCP18 2100 uplift	2019-2100	0.947

⁷ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-1>

⁸ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-3>

Table 2-6: Tees Tidal UKCP18 Tees Tidal Climate Change Uplift Levels

Events	2017-2019 (present day)	2030	2070	2100
T2 (2 year)	3.45	3.52	3.94	4.40
T100 (100 year)	3.98	4.05	4.47	4.93
T200 (200 year)	4.08	4.15	4.57	5.03
T1000 (1000 year)	4.33	4.40	4.82	5.28

2.3.1.3 Offshore Wind Speed and Extreme Wave Height Allowance

Wave heights may change because of increased water depths. The frequency, duration and severity of storms could also change. At this point wave modelling has not been included in EA models. If required at a future stage in the project an allowance of 10% should be applied to coastal modelling. Nationally available flood maps do not currently show the impact of waves.

Table 2-7: EA Offshore wind speed and extreme wave allowance

Applies around all the English coast	2000 to 2055	2065 to 2125
Offshore wind speed allowance	5%	10%
Offshore wind speed sensitivity test	10%	10%
Extreme wave height allowance	5%	10%
Extreme wave height sensitivity test	10%	10%

2.3.2 Pluvial Flooding

The EA long term flood risk mapping shows the site is at some risk from surface water flooding. There is no clear area of flow path present, just many small areas of isolated extent in low spots, illustrated in Figure 2-5 below and can be observed in the Level 2 SFRA maps¹⁶. This is due to the uneven nature of the DTM at the site and will differ if the site is developed. The surface water flooding is present at low, medium and high risks. The high risk areas at the site are all below 0.9m depth, whereas the medium and low risk extents are over 0.9m in some places. The A1053 access road has a more continuous area of surface water flood risk, this may cause access issues to site and presents a flow path for surface water flooding.



Extent of flooding from surface water

● High ● Medium ● Low ○ Very low ⊕ Location you selected

Figure 2-5: Extract from EA Long term surface water flood risk map⁹

2.3.2.1 Climate Change

With respect to surface water flood risk mapping and design of drainage systems (including blue-green networks and minor watercourses with a catchment of less than 5km²) the allowances outlined in the table below should be used. As the development has a design life of 100 years the default design parameters are to design for the 20% and sensitivity check for the 40%.

⁹ EA Long term flood risk for surface water. <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=453987&northing=522641&address=10034526609&map=SurfaceWater> [Accessed 26 May 2020]

Table 2-8: EA Peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

2.3.3 Groundwater Flooding

Groundwater flooding is flooding that is caused by unusually high groundwater levels or flow rates. During flooding, groundwater can emerge at the ground surface or within man-made underground structures such as basements. There are various mechanisms of groundwater flooding, including clearwater flooding due to prolonged heavy rainfall on distant connected geology alluvial and coastal groundwater flooding, and that associated with minewater rebound or ground subsidence.

The EA alongside the BGS have developed a groundwater vulnerability map¹⁰ accessed through the DEFRA MAGiC Map portal. This designates the site as in an area of Medium-High risk from groundwater. These risk levels are described on the BGS website as:

- High: areas able to easily transmit pollution to groundwater, characterised by high-leaching soils and the absence of low-permeability superficial deposits.
- Medium: areas that offer some groundwater protection. Intermediate between high and low vulnerability.

2.3.4 Sewers, Culverts and Bridges

The watercourses across and surrounding the site have been significantly modified and have either been culverted or straightened. The three main structures are:

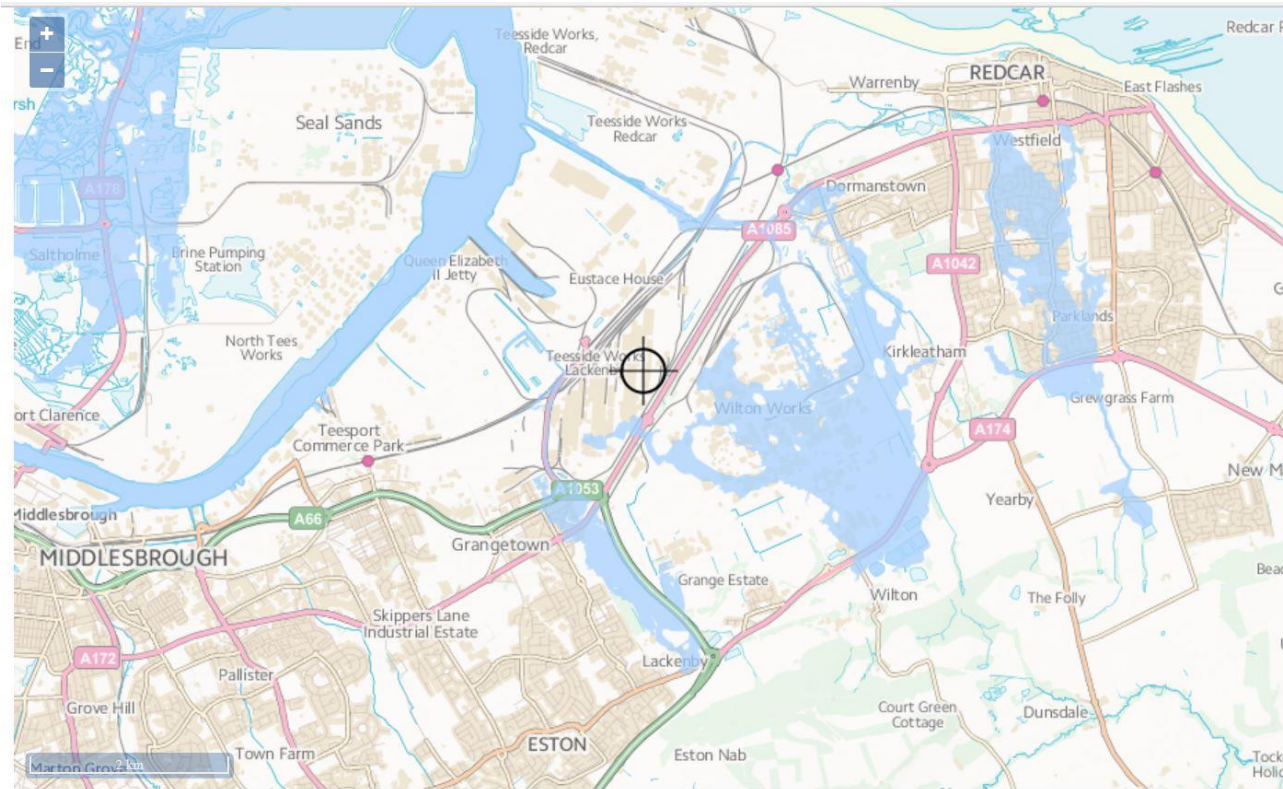
- Culvert conveying the Boundary Beck across the site from south to north,
- The culvert conveying the Kinkerdale Beck to its junction with the Boundary Beck, Culvert conveying the Boundary Beck and the Kinkerdale Beck under the railway and Tees Dock Road to the Lackenby Channel.

The Boundary Beck is the main watercourse within the site, running from south to north. At the northern end of the site the Kinkerdale Beck converges with the Boundary Beck. Another culvert then conveys the Boundary Beck and Kinkerdale Beck under the railway line north of the site to the Lackenby Channel. All watercourses within the site are culverted however the Lackenby Channel north of the site emerges from the culvert into open channel on the northern side of the railway bridge.

2.3.5 Reservoir Flooding / Breach

The EA flood maps (2020), show that the site is partially at risk of flooding from four reservoirs approximately 3.5km south east of the site located at OS NGR NZ 58749 20362. Flooding from reservoirs would be likely to accumulate in the low-elevation depressions to the south of the site, but the predominant flow path is north along Tees Dock Road A1053.

¹⁰ BGS Groundwater vulnerability data. <https://www.bgs.ac.uk/products/hydrogeology/GroundwaterVulnerability.html> [Accessed 27 May 2020]



Extent of flooding from reservoirs

● Maximum extent of flooding ⊕ Location you selected

Figure 2-6 Extract from the EA Flood Maps for reservoir flooding

2.4 Flood History

The following sources were consulted:

- **Readily available archives** - internet based sources including the British Hydrological Society Chronology of British Hydrological Events¹¹ and Google Newspaper Archive¹². No specific information for this area was available from these archives.
- **Environment Agency (Risk Management Authority under the Water Management Act and Flood Risk Regulations)** - open data records noted the occurrence of one flood event within the Tees Estuary on 05/12/2013 and was recorded to be due to operational failure/breach of defence and the source was coastal. This event did not breach onto the site. The flood event was due to a high spring tide mixed with the failure of the flood defence embankment at the south side of Greatham Creek (5km to the north west of the site)¹³. Since this event, a new flood defence scheme has been completed at Port Clarence and Greatham South¹⁴.
- **Redcar and Cleveland Borough Council (Lead Local Flood Authority and Risk Management Authority under the Water Management Act and Flood Risk Regulations)** - provided historic flood photographs for the wider STDC site, these were not georeferenced and lack name and date information which makes locating and using them difficult. One photo showed that Tees Dock Road was flooded in September 2015 (anticipated to be located north of the roundabout where Tees Dock Road is joined to the A66 and A1053, next to the south western boundary of the site). Further historic flood records were requested¹⁵ but the RCBC had no records for the main site. This does not indicate that no incidents have occurred but that none have been recorded.
- **The SFRA reports from 2010¹⁶ and 2016¹⁷** - use of existing data from these projects has been granted by RCBC for this project. The Level 1 report states that RCBC has little data on fluvial or tidal flooding. In this report NW provided their register on surface water flood events. These were concentrated in the main residential areas of Eston and Redcar and none were identified in the vicinity of the site.
- **Historical Mapping** – The online National Library of Scotland (NLS)¹⁸ archives have been reviewed. These show the site was originally mudflats in the Tees estuary. The site was previously fields up until the 1950s when steelworks took over the site.

11 Chronology of British Hydrological Events. <http://cbhe.hydrology.org.uk/> [Accessed 15 May 2020].

12 Google Newspaper Archive. <https://news.google.com/newspapers> [Accessed 26 May 2020].

13 Stockton-on-Tees Borough Council LLFA Flood Investigation Report, Tees Tidal Flooding, March 2014

14 "Hartlepool public invited to opening of new £14.5m flood defence scheme", Hartlepool Mail , 16 October 2018

15 Email from Nigel Hill, Drainage & Flood Risk Manager of Council flood team, received 30 January 2020

16 Redcar and Cleveland Borough Council Level 2 Strategic Flood Risk Assessment, August 2010

17 Redcar and Cleveland Borough Council Level 1 Strategic Flood Risk Assessment Update, May 2016

18 National Library of Scotland. <https://maps.nls.uk/geo/explore/#zoom=4&lat=55.78537&lon=-3.16449&layers=1&b=1> [Accessed 26 May 2020]

2.5 Flood Estimation

Flood risk is a combination of the likelihood of flooding and the potential consequences arising. It is assessed using the source – pathway – receptor model.

Flood mapping for fluvial and coastal / tidal risk are available from previous studies undertaken. These studies extend across the site and the surrounding STDC area and which can be used to inform this high level assessment of flood risk:

- Tidal: The Tees Estuary model developed for the EA by JBA documents coastal flood risk for entire site. This was recently updated by JBA to account for the UKCP18 climate change uplift values. Wave action is not accounted for however the protection offered by the existing sand dunes system and historic railway embankment have been included.
- Fluvial: The Fleet system comprising of the Fleet and its main tributaries were modelled for Redcar & Cleveland Borough Council by JBA in 2015. The study featured a detailed survey which included all of the in-channel structures within the STDC site.

No surface water modelling had been undertaken to date and since the EA flood maps indicated that there were pockets of pluvial flooding across the site, a preliminary surface water model was run to give a high-level overview of pluvial flood risk as part of the Data Collection and Baseline Assessment¹⁹ undertaken as Phase 1 of the Water Management Strategy for the STDC development. Details of the pluvial modelling and analysis of flow pathways and potential flood receptors are provided below.

The preliminary pluvial mapping will be updated by more detailed mapping in Phase 2 of the works for the STDC strategy which will allow for a more detailed analysis of flood risk.

2.5.1 Approach to Peak Flow Estimation

Preliminary hydrological data for the high level assessment of pluvial flooding was based upon Flood Estimation Handbook (FEH) catchment areas (shown in Figure 2-2) and FEH13 rainfall, which were downloaded from the FEH web-service tool along with the catchment descriptors (tabulated in

¹⁹ Phase 1 – Data Collection and Baseline Assessment, JBA Consulting for Faithful & Gould on behalf of STDC, May 2020

Table 2-1).

2.5.2 Hydraulic Modelling

The preliminary surface water flood maps were generated using InfoWorks Integrated Catchment Modelling (ICM) software version 9.5. InfoWorks ICM is an advanced integrated catchment modelling software used to model complicated hydrological and hydraulic systems efficiently. It also allows the user to combine natural solutions with piped (network) modelling to suggest improvements to capacity and create scenarios to optimise flood risk management. The inputs required were a Digital Terrain Model (DTM) to represent the ground of the area of interest and FEH13 rainfall.

The DTM was created using LiDAR 2m spatial resolution DTM data. Denser LiDAR data is available but was not utilised at this high-level stage in the project. DTM processing was completed using 3D analyst tools in ArcMap 10.4 with ASCII files exported and added to InfoWorks ICM to create the ground model.

The modelling directly applied the FEH2013 rainfall from the Lackenby Channel catchment over the 2m LiDAR DTM. The model was run for the 100-year and 100-year plus climate change scenarios. Further model runs will be undertaken during more detailed analysis in Phase 2 of the study.

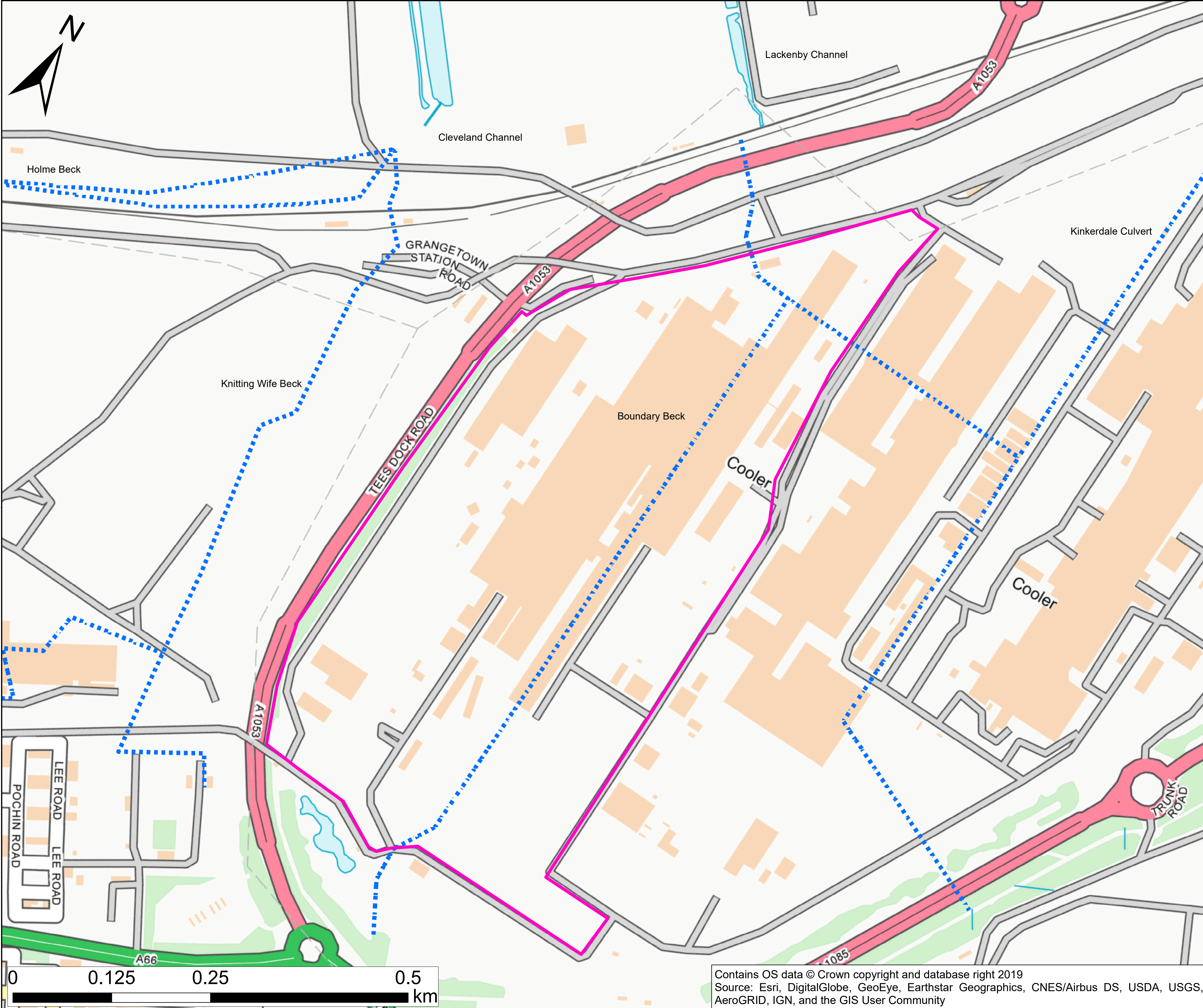
The model results were exported into geodatabases for analysis within ArcMap 10.4 which was used to create the following flood risk screening maps:

- 100yr surface water
- 100yr +20%cc surface water
- 100yr+ 40%cc surface water
- 100yr fluvial (Fleet Model)
- 200yr coastal +SLR
- 200yr coastal +SLR, 100yr surface water, Fleet 100yr
- 200yr coastal +SLR, 100yr+40%cc

2.5.3 Assumptions and Limitations of the Modelling

The modelling undertaken was for the preliminary stage of the water management strategy and due to the high-level nature of the preliminary flood risk screening exercise it was necessary to make a number of key assumptions and apply limitations for the modelling as follows:

- Limited to 2 scenarios 100yr and 100yr plus climate change.
- A 20% and 40% climate change uplift has been applied to the rainfall hyetographs in line with EA guidance.
- The model was run as a full blockage scenario. This highlights potential flood risk and details areas within the development suitable for conveyance. It can also inform more detailed modelling.
- The model does not include any losses to account for interception into existing surface water drainage systems or infiltration into the ground. A value of 70-75% is applied
- The model does not account for flooding of the sewer network.
- FEH Catchment data from the surrounding areas were used to allow direct application of rainfall on LiDAR within the sites of interest.
- A 2m resolution DTM was utilised.
- A storm duration of 60 minutes was used to allow high level assessment of overland flow paths.



- Legend**
- Lackenby_Boundary
 - Culverted Watercourses
 - Fleet Model 100-year Flood Extents

Rev.	Modifications	Date	Drawn	Checked	Approved

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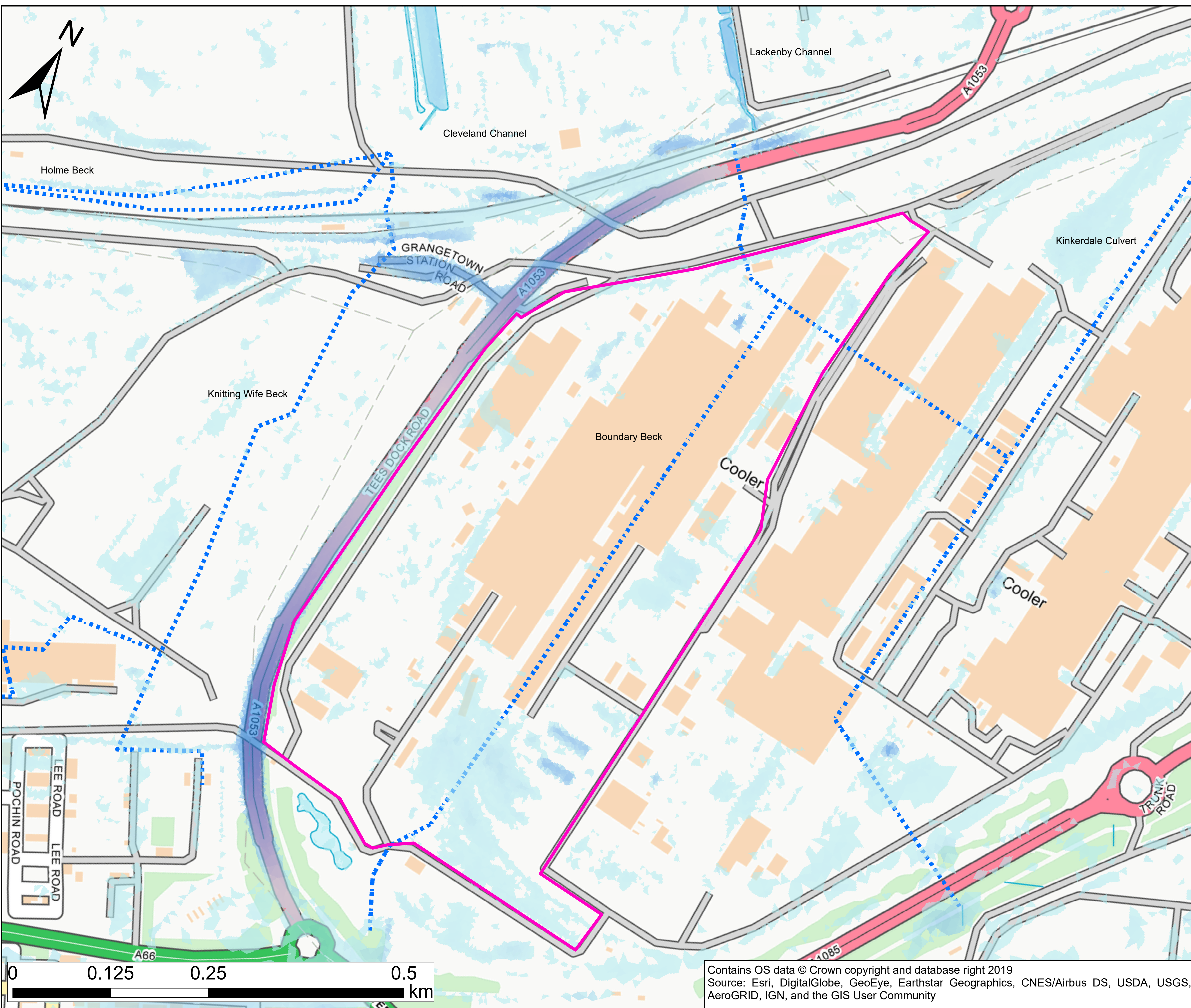
**FLOOD RISK SCREENING MAPS
 1:100YR FLEET MODEL RESULTS**

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Digital File Name: EPB-JBAU-00-LA-MP-EN-0007-Lackenby_100yr_Fleet_Model	Sheet No.: 7 of 7	Status: S0	Rev.: P01
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Legend

- Lackenby Site Boundary
- 100-year Surface Water Extents**
- Depth (m)
- High : 5.70
- Low : 0.10
- Culverted Watercourses

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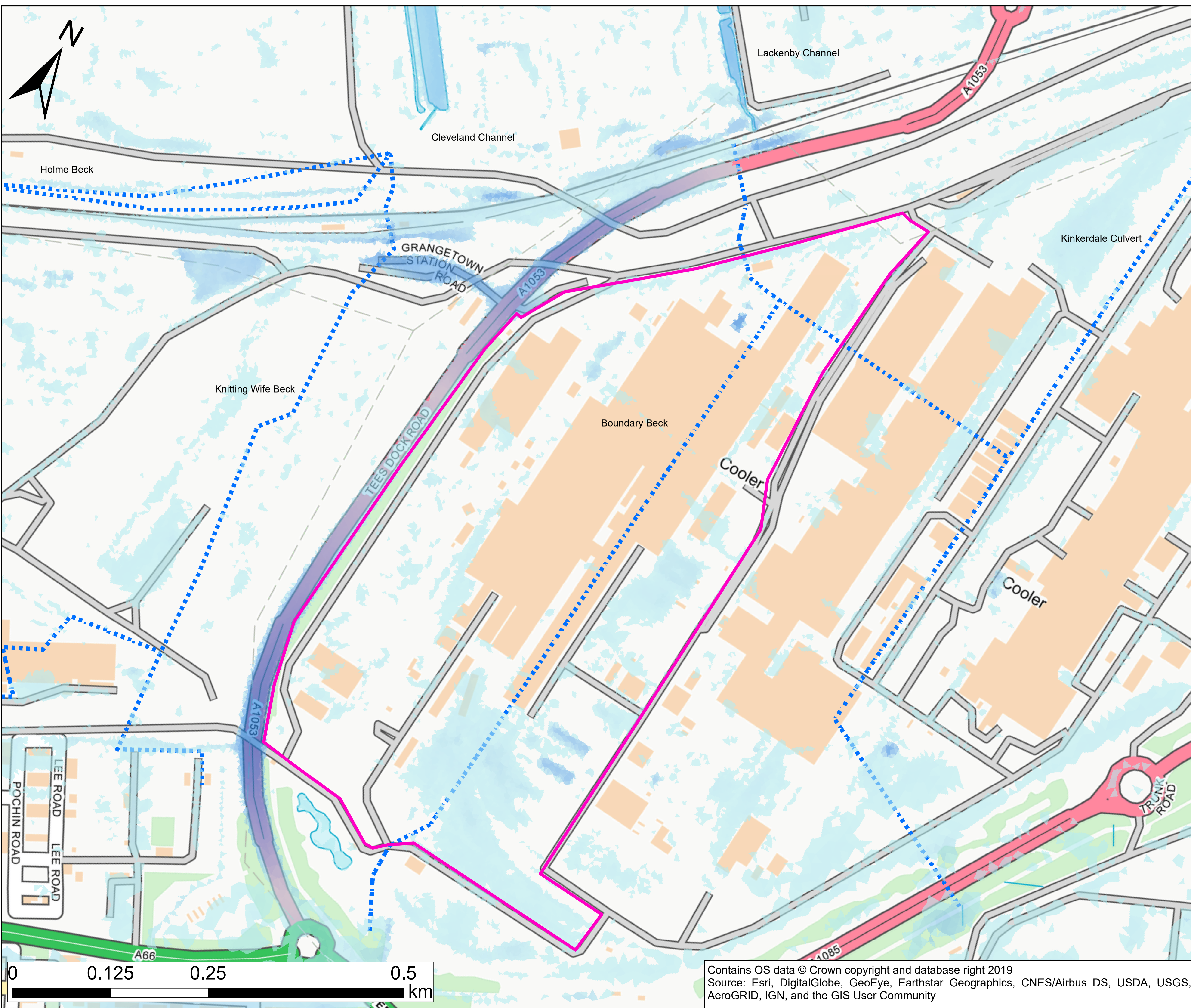


FLOOD RISK SCREENING MAPS
1:100YR SURFACE WATER FLOOD RISK

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Drawing Number: 0001	Sheet No.: 1 of 7
	Status: S0
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Legend

- Lackenby_Boundary
- 100-year + 20% CC Surface Water Extents**
- Depth (m)**
- High : 5.76
- Low : 0.10
- Culverted Watercourses

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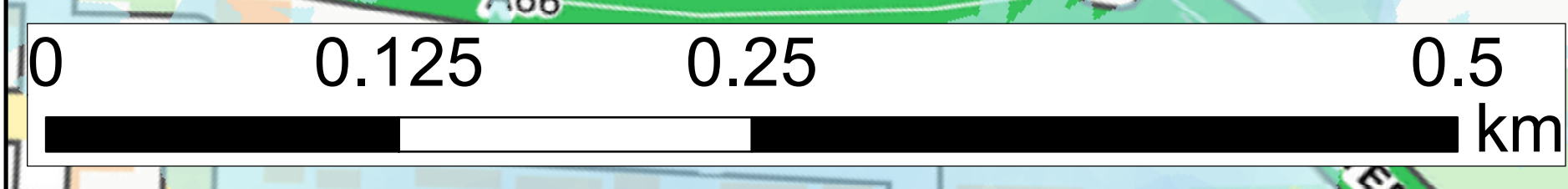
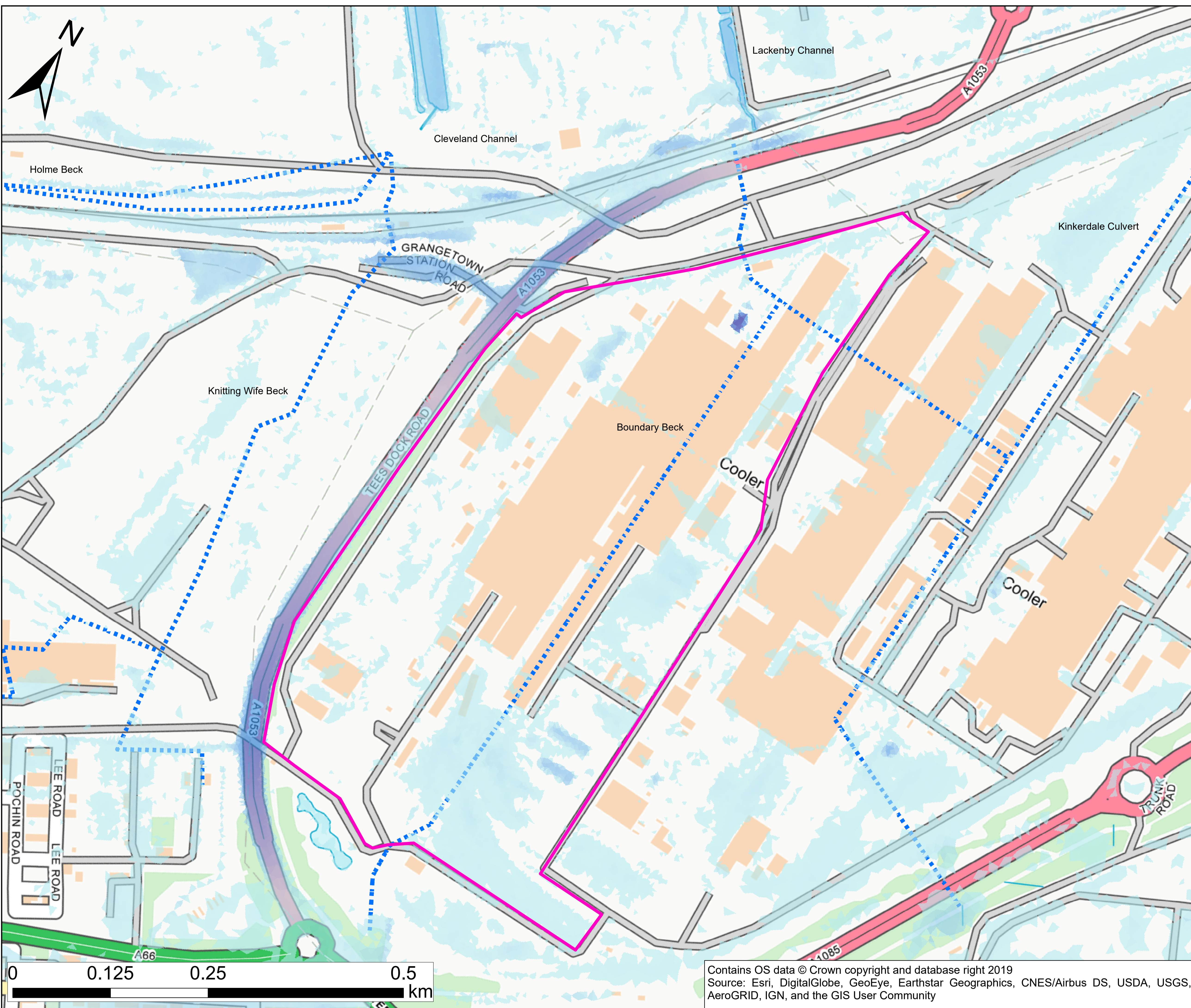


FLOOD RISK SCREENING MAPS
1:100YR + 20% CC SURFACE WATER FLOOD RISK

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Drawing Number: 0002	Sheet No.: 2 of 7
	Status: S0
	Rev.: P01

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Legend

- Lackenby_Boundary
- 100-year + 40 % CC Surface Water Extents**
- Depth (m)**
- High : 6.91
- Low : 0.10
- Culverted Watercourses

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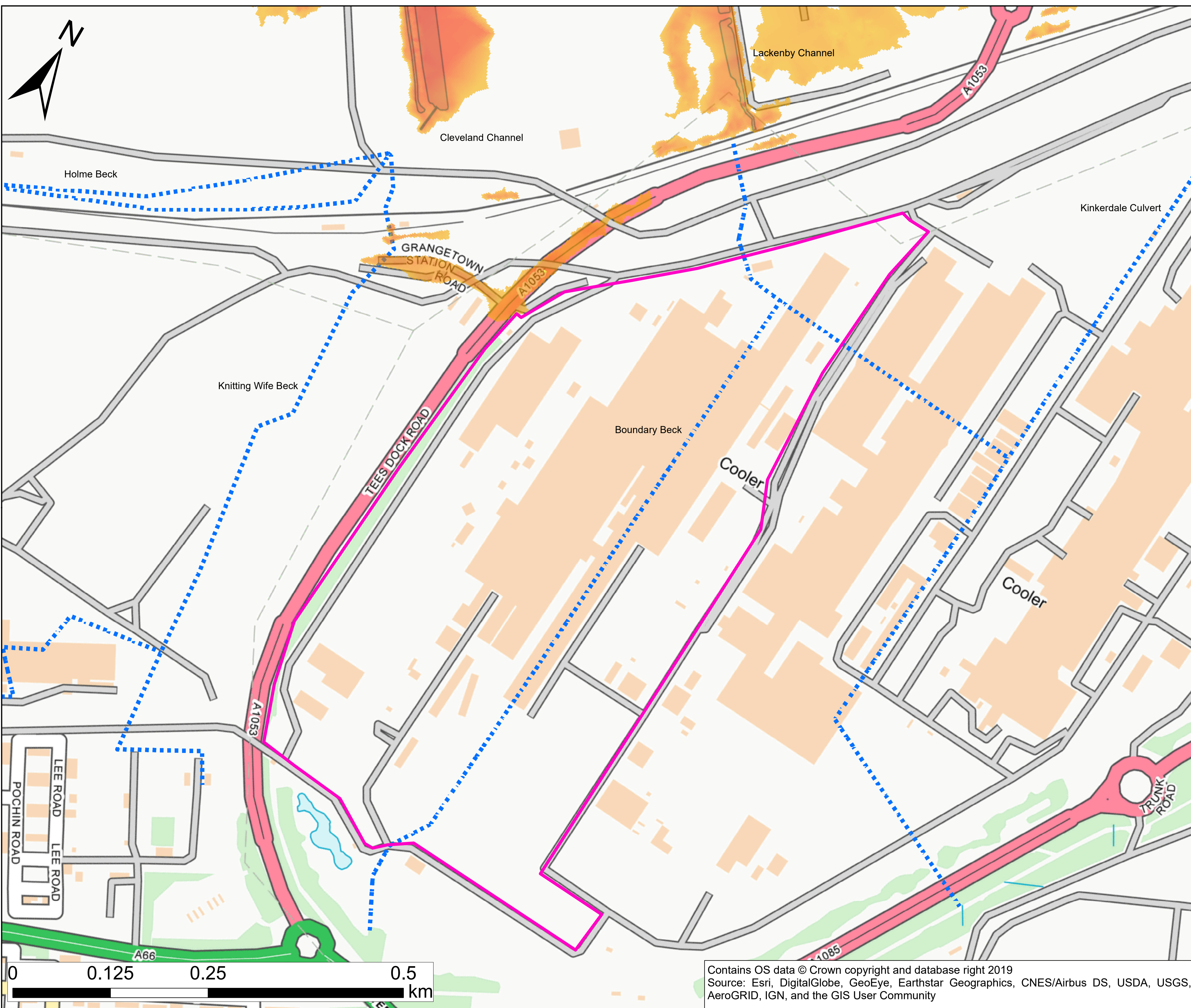


FLOOD RISK SCREENING MAPS
1:100YR + 40% CC SURFACE WATER FLOOD RISK

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Digital File Name: EPB-JBAU-00-LA-MP-EN-0003-Lackenby_100yr_40CC_SW	
Drawing Number: 0003	Sheet No.: 3 of 7
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Legend

- Lackenby_Boundary
- 200-year Coastal Risk + Sea Level Rise Allowance**
- Value**
- High : 7.43
- Low : 0
- Culverted Watercourses

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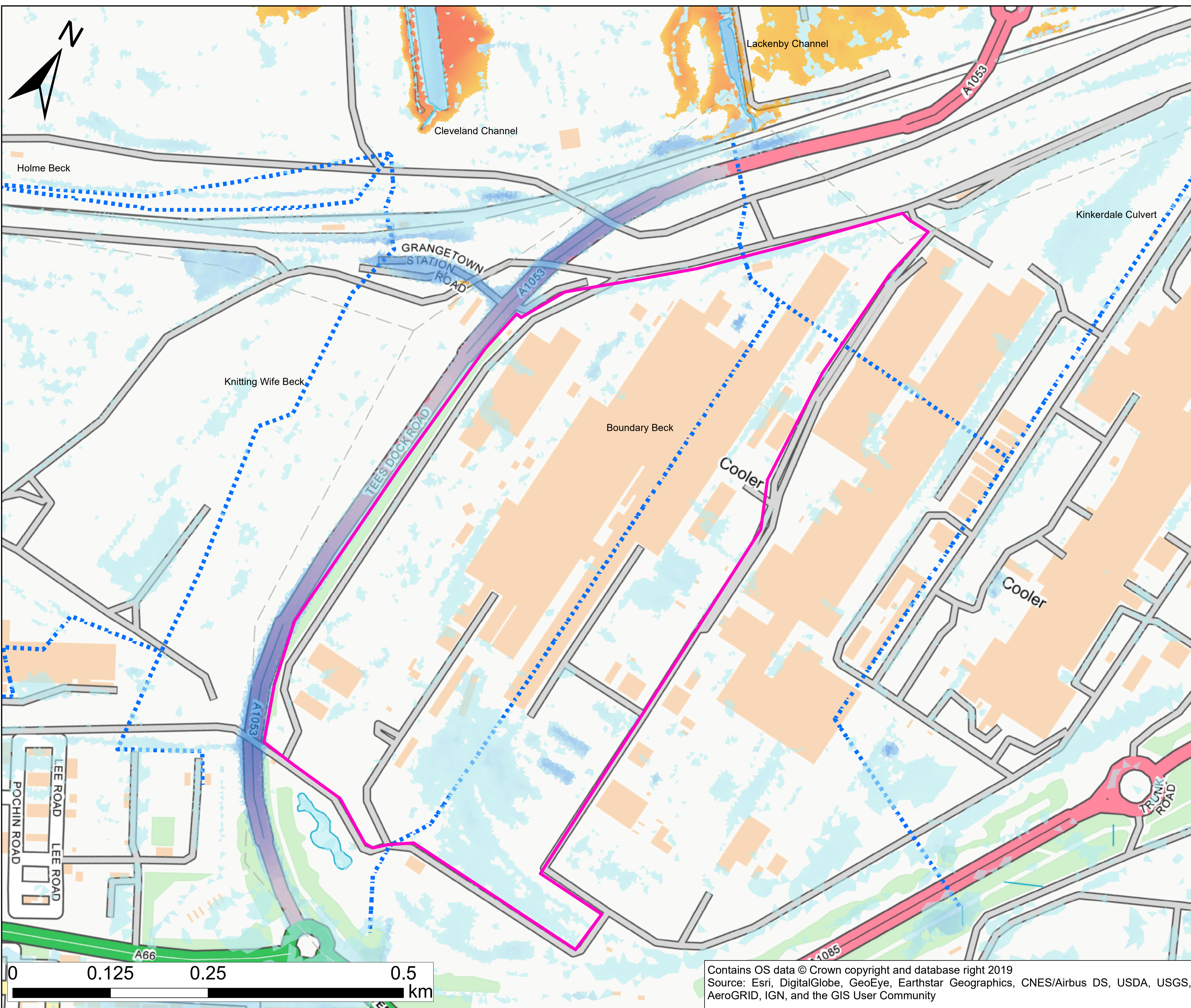
FLOOD RISK SCREENING MAPS
 1:200YR COASTAL FLOOD RISK + SEA LEVEL RISE ALLOWANCE TO 2100 (5.03mAOD)

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Legend

- Lackenby_Boundary
- 100-year Surface Water Extents**
- Depth (m)
 - High : 5.69
 - Low : 0.10
- 200-year Coastal Risk + Sea Level Rise Allowance**
- Value
 - High : 7.43
 - Low : 0
- Culverted Watercourses

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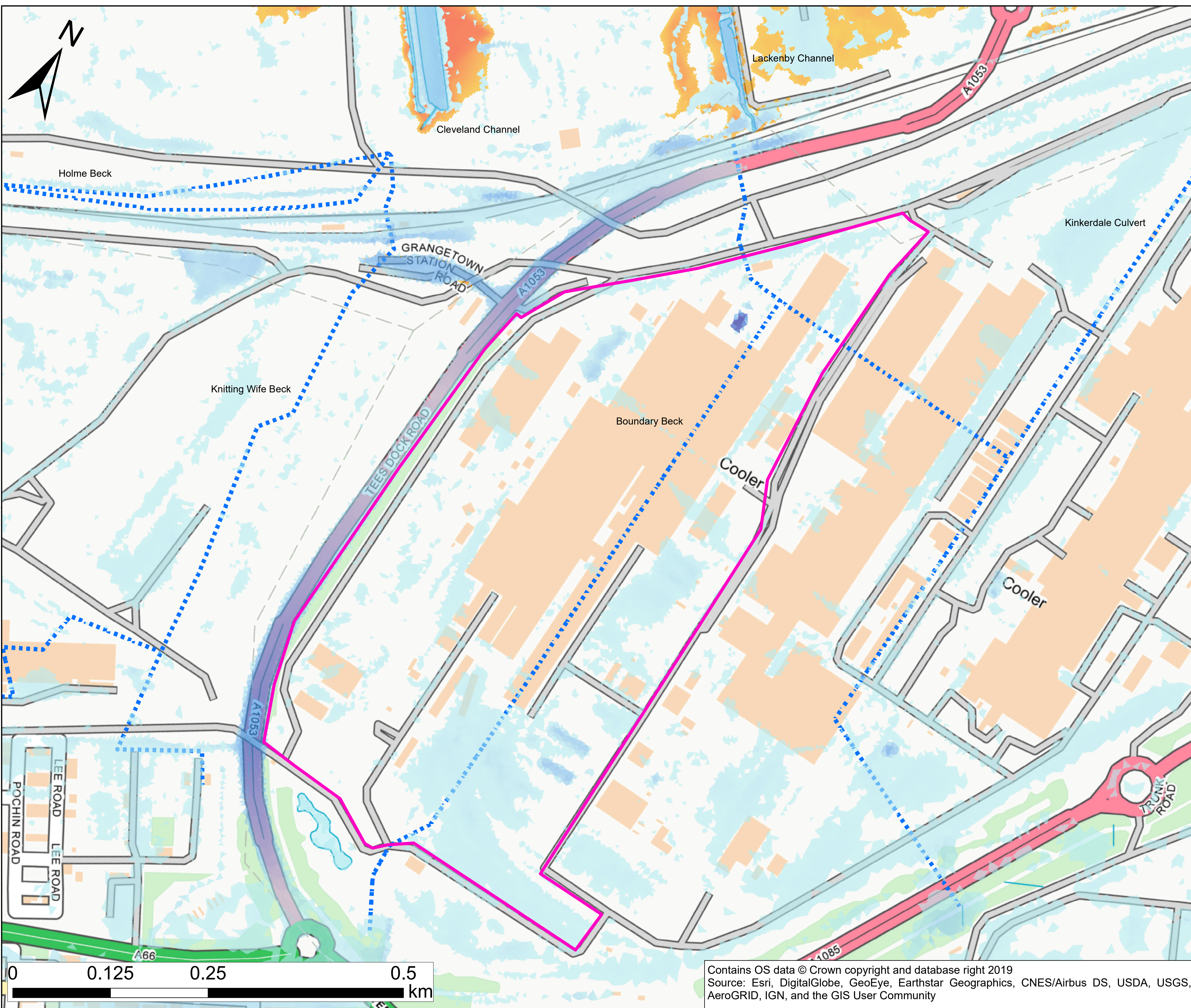


**FLOOD RISK SCREENING MAPS
 COMBINED FLOOD RISK**

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Legend

- Lackenby_Boundary
- 100-year + 40 % CC Surface Water Extents**
- Depth (m)
 - High : 6.91
 - Low : 0.10
- 200-year Coastal Risk + Sea Level Rise Allowance**
- Value
 - High : 7.43
 - Low : 0
- Culverted Watercourses

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FLOOD RISK SCREENING MAPS
 COMBINED FLOOD RISK WITH CLIMATE CHANGE

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2.5.4 Pre-Development Scenario

Findings from previous studies and the surface water modelling described above have been used to summarise flood risk to the site from different sources.

At the flood risk screening stage it is necessary to assign a preliminary flood risk to each of the development areas. Flood risk is typically classed based on likelihood of flooding to occur combined with the severity and consequence of the flooding. At this stage in the process information is limited to the return periods available during the data gathering process and preliminary surface water modelling. Hence in order to give preliminary flood risk categories the following scoring system has been adopted.

- High: Substantial coverage of proposed development area by flooding of one or more flooding sources. Flow paths are often clear and linked with flood water ponding at substantial depths (1m>).
- Moderate: Moderate cover of the proposed development area by one or more flooding sources. Flow paths maybe less clear with areas of ponding typically between 0.3m-1m deep.
- Low: Only a small portion of the proposed developable land is affected by ponding of shallow depths typically up to 0.3m deep. Isolated areas of shallow ponding are frequent typically related to the demolition of industrial buildings.
- Very Low: Little to no flooding within developable area. Any flooding is typically isolated to localised low points at depths of <0.3m. Isolated areas of shallow ponding are frequent typically related to the demolition of industrial buildings

2.5.4.1 Fluvial Flood Risk

The site is at a very low risk from fluvial flooding and all watercourses within the site are culverted. The main watercourses within the site are the Boundary Beck and the Kinkerdale culvert. These watercourses join the Lackenby Channel north of the site. The Lackenby Channel also receives flow from the Cleveland Channel, which is a large open channel that receives flows from the Holme Beck and Knitting Wife Beck culverts west of the site. Flows in the Cleveland Channel are conveyed to the Lackenby Channel around an area associated with iron and steel production recycling. In the Lackenby Channel downstream of the confluence with the Cleveland Channel there is an in-channel structure assumed to act as a tidal weir. Beyond the weir the Lackenby Channel is a deep large open channel that drains to a culvert of unknown dimension which conveys flows below Teesport to an outfall on the River Tees.

The likelihood of fluvial flooding to the site is very low since the site is elevated above surrounding ground and the watercourses across the site are culverted at depth and are unlikely to exceed the culvert capacity. There are no open watercourses within the site. Potential fluvial flooding from the open Lackenby Channel north of the site is not anticipated to reach the site.

2.5.4.2 Coastal and Tidal Flood Risk

The site is at very low risk from coastal flooding. As part of the Level 2 Strategic Flood Risk Assessment (SFRA), a detailed model was created to supersede the broad scale EA tidal flood risk mapping.

The modelling shows inundation just north of the site along the A1053 Tees Dock Road however this is not anticipated to enter the site.

As previously mentioned, the coastal flood modelling does not take into account the presence of tidal limiting structures such as flap valves and weirs. As such there is a lower confidence in the flood mapping of the inland areas, but the lowest elevations of the site are significantly above modelled coastal flood levels.

2.5.4.3 Surface Water Flood Risk

The site is at a moderate risk from surface water flooding. The area at most risk is the localised depressions associated with past steelworks to the south east of the site (next to the raised mounds). There are no clear overland flow paths associated with surface water flooding. The surface water flooding across the remainder of SIZ3 is predominantly formed of a large number of shallow (0.3m-0.5m deep) localised depressions in which water can pond. With redevelopment there is the opportunity to regrade the ground and provide positive overland flow paths to drainage channels where surface water can be managed.

2.5.5 Post Development Scenario

In terms of planning and plot-based design it is likely that the tidal levels are to be the defining factor in terms of plot elevations. A tidal flood level of 5.03mAOD represents the 1:200yr Coastal Flood Risk + Sea Level Rise Allowance to 2100 design scenario. It is therefore recommended that the ground levels for the site will be set to this level or greater, so that flood risk is outwith the extent of coastal or fluvial flooding and therefore risk is very low.

The water management strategy for the STDC area including this site is currently being developed. Whilst the straightened and culverted watercourses through and surrounding the site present constraints to development, they also provide significant opportunities to manage flood risk and improve biodiversity, linking a number of priority habitats and species with internationally important designations.

There is therefore an aspiration for a Water Sensitive Urban Design, which is a land planning and engineering design approach which integrates the urban water cycle, including stormwater, groundwater and wastewater management and water supply, into urban design to minimise the cost of infrastructure, environmental degradation, and improve aesthetic and recreational appeal. This could take the form of blue-green networks which would extend across the site.

3 Flood Mitigation Measures

3.1 Flood Warning System and Existing Alleviation

The site is not within an EA Flood Warning or Flood Alert area. Within the Tees Estuary and low-lying land surrounding it there is the Tidal River Tees flood alert area (code 121WAT926). The monitoring station for this area is the River Tees at Tees Dock, station ID 8372, located at the Teesport dock, 1.8km north west of the site boundary.

There are no flood alleviation schemes within the site or affecting the small watercourses through the site. The closest scheme is the Port Clarence and Greatham South scheme, mentioned in Section 2.4. These are designed to protect homes and businesses in Port Clarence.

3.2 Asset Design and Protection

Any new development should be located outwith the functional floodplain with a final floor level equivalent to the 0.5% (200 year) flood level plus allowances for climate change and freeboard.

The tidal flood level of 5.03mAOD represents the 200 year Coastal Flood Risk + Sea Level Rise Allowance to 2100 design scenario. It is recommended that the ground levels for the site will be set to at least 5.03mAOD and therefore above the level to which flooding is anticipated however the site is not anticipated to be within the extent of coastal or fluvial flooding and therefore flood risk to the site is very low.

There is a medium-low risk of groundwater flooding throughout the STDC site¹⁰ however, this is expected to be limited to basements and other below ground structures where flood resilience will rely on the performance of waterproofing and pumping systems.

This assessment has been undertaken as a high level analysis of flood risk to the site. Further mapping and modelling of flood risk will be required as part of the reserved matters stage of the planning process in relation to the drainage design and this will further identify opportunities and constraints.

3.3 Surface Water and Drainage Management

One of the core principles of STDC's strategy for the area is to promote a low carbon circular economy development, reducing energy costs and waste minimisation. Key principles to achieve this are embodying a strategy of Water Sensitive Urban Design. Water sensitive urban design is a land planning and engineering design approach which integrates the urban water cycle, including stormwater, groundwater and wastewater management and water supply, into urban design to minimise the cost of infrastructure, environmental degradation, and improve aesthetic and recreational appeal. Considering this principle and the information about the site a drainage strategy has been devised using blue-green corridors which offer multiple benefits including habitat creation, place making, increased amenity benefit and re-naturalisation of watercourses.

Blue-green infrastructure is of importance within the drainage strategy and forms a key part of delivering a sustainable eco-industrial park. The preliminary drainage strategy has been created by analysing the overland flow paths, drainage catchments, topography and development parcels.

3.4 Safe Access and Egress

Whilst outwith the site boundary, the flood maps show that the main access route from the south along the A1053 (Tees Dock Road) is at risk from flooding from surface water sources to depth and velocities of under 0.9m and over 0.25ms⁻¹ (south west of the site) at the high risk level. At a medium risk the depths exceed 0.9m and flood velocities increase over 0.25 ms⁻¹ in some locations and water flows towards a low spot at the railway crossings. At a low risk (less than 0.1% AEP) the flood velocities are mostly over 0.25 ms⁻¹

and depths reach over 0.9m for a c. 150m stretch along the road to the western boundary of the site. Large emergency vehicles may be able to operate in flood depths of up to 0.9m²⁰, so in the instance of a large flood event, it is anticipated that emergency access would be possible to the site at the southern boundary. Emergency access and egress routes shall be included as part of the site operations plan.

3.5 Potential Impact of the Proposed Development on Flood Risk Within and Outwith the Site

Since the ground levels are above the 200 year Coastal Flood Risk + Sea Level Rise Allowance to 2100 design scenario, the proposed development is at very low risk of coastal and fluvial flooding and it is not anticipated to have an impact on fluvial flood risk within or outwith the site. However, since the site is at risk from surface water flooding, there could potentially be an impact of the proposed development on surface water flood risk in terms of increased rate and volume of runoff. Consideration for the impact of this on the fluvial environment should be taken into account, including surface runoff attenuation.

The site boundary at present is located at or greater than 20m from the Tees. An environmental permit is required for any activity that may pollute the air, water or land; increase flood risk; or adversely affect land drainage and work on or near main rivers requires a permit. The River Tees is designated as a main river but as the other watercourses across the site are not main rivers, the EA guidelines advise contacting the local council or internal drainage board to check if land drainage consent is required. <https://www.gov.uk/guidance/check-if-you-need-an-environmental-permit> Permits are generally required for:

- Any activity within 8 metres of the bank of a main river, or 16 metres if it is a tidal main river,
- Any activity within 8 metres of any flood defence structure or culvert on a main river, or 16 metres on a tidal river.

Once the design for the site is developed, consultation should be undertaken with the Flood Risk Management Authorities.

20 Defra/Environment Agency Flood and Coastal Defence R&D Programme: R&D Outputs: Flood Risks to People, FD2321/TR2 Guidance Document, 2006.

4 Conclusions

This high level FRA has been prepared in accordance with NPPF for the proposed Lackenby development at part of the SIZ3 site, also part of the wider STDC area. The proposed development lies within Flood Zone 1 which means it has a chance of flooding of less than 0.1% - equivalent to the 1000-year event.

Modelling undertaken previously for the Tees indicates that the site is at very low risk from fluvial flooding. Detailed modelling of the watercourses including the Lackenby and Cleveland channels as well as the culverts, tidal weir at the Lackenby outfall to the Tees and other structures present, has not to date been undertaken and would be required to inform future designs as part of the reserved matters stage of the planning process. However, the inflows to the site would be limited by the upstream culverts so there is unlikely to be a high risk from these sources in addition to that already identified by the high level modelling.

There is a very low coastal/tidal flood risk at the site therefore there is not anticipated to be an impact of the proposed development on flood risk outwith the site.

Modelling of overland flow indicates that there is a moderate risk from surface water flooding and therefore the impact of the development on surface water flood risk should be taken into account, including the need for any attenuation to reduce flood risk to the proposed and existing property. Water pools in low spots on the site, notably the depressions at the south east of the site. Mostly flows are shallow and do not follow any clear overland flow paths. The aspiration for the development of a sustainable drainage strategy and aspiration for blue-green networks will create flow paths for this water to reduce the risk at the site.

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