APPENDIX D
ENVIRONMENT AGENCY CORRESPONDENCE

Emma Rowlands

Our ref: CCN/2018/99171

Date: 26/09/2018

Dear Emma Rowlands

Provision of Flood Risk Information for Warden Tree Lane, Spalding

Thank you for your request to use our flood risk information in the development of the Flood Risk Assessment (FRA) for the above site. The information is set out below and attached. It is important you read any contextual notes on the maps provided.

We aim to review our information on a regular basis, so if you are using this data more than twelve months from the date of this letter, please contact us again to check it is still valid.

Flood Map

The attached map includes the current Flood Map for your area. The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map also shows the location of formal raised flood defences and flood storage reservoirs. It represents areas at risk of flooding for present day only and does not take account of climate change.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered flooding may occur from other sources such as surface water sewers, road drainage, etc.

History of Flooding

With regards to the history of flooding I can advise we do not have any records of flooding in this area. It is possible other flooding may have occurred we do not have records for, and other organisations, such as the Local Authority or Internal Drainage Boards, may have records.

Fluvial Flood Risk Information

Fluvial Defence Information

The fluvial defences reducing the risk of flooding to this site consist of earth embankments. They are in fair condition and reduce the risk of flooding to a 1% (1 in 100) chance of occurring

in any year. We inspect these defences routinely to ensure potential defects are identified.

Modelled Levels and Flows
Available modelled fluvial flood levels and flows for the model nodes shown on the attached map are set out in the data table attached. This data is taken from the model named on the data table, which is the most up-to-date model currently available.

Please note these levels are “in-channel” levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

Tidal Flood Risk Information

Tidal Defence Information
The tidal defences protecting this site consist of earth embankments. They are in fair condition and reduce the risk of flooding to a 1% (1 in 100) chance of occurring

Tidal/Breach Flood Levels
The attached table shows our current best estimate for extreme tide levels.

Levels for the Humber Estuary have an assessment date of 2014, with others having an assessment date of 2006, which should be used in any consideration of future increases due to climate change.

Modelled Hazard Mapping
Please refer to South Holland District Council’s hazard mapping undertaken for their Strategic Flood Risk Assessment (SFRA). Please go to http:// www.southeastlincslocalplan.org/2016-update-of-south-holland-strategic-flood-riskassessment-spalding-maps/ for the updated 2016 maps.

Development Planning

If you would like local guidance on preparing a flood risk assessment for a planning application, please contact our Sustainable Places team at lnplanning@environment-agency.gov.uk. It will help if you mention this data request and attach your site location plan.

We provide free preliminary advice; additional/detailed advice, review of draft FRAs and meetings are chargeable at a rate set to cover our costs, currently £100 (plus VAT) per hour of staff time. Further details are available on our website at https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals.

General advice on flood risk assessment for planning applications can be found on GOV.UK at https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

Climate change will increase flood risk due to overtopping of defences. Please note the climate change data included has an allowance for 20% increase in flow. Updated guidance on how climate change could affect flood risk to new development - ‘Flood risk assessments: climate change allowances’ was published on GOV.UK in February 2016. The appropriate updated climate change allowance should be applied in a Flood Risk Assessment.

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

Supporting Information
Please see the Standard Notice or licence for details of permitted use. The Standard Notice can be found at the link below.
http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

We respond to requests for recorded information we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

Further information on flood risk can be found on the GOV.UK website at:
https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

Other Flood Risk Management Authorities
The information provided with this letter relates to flood risk from main river or the sea. Additional information may be available from your Lead Local Flood Authority (ie county council or unitary authority) or, where they exist, the Internal Drainage Board.

Further Contact
I hope we have correctly interpreted your request. If you are not satisfied with our response to your request for information, you can contact us within two calendar months to ask for our decision to be reviewed.

If you have any queries or would like to discuss the content of this letter further please contact Rachael Storey using the details below.

Yours sincerely,

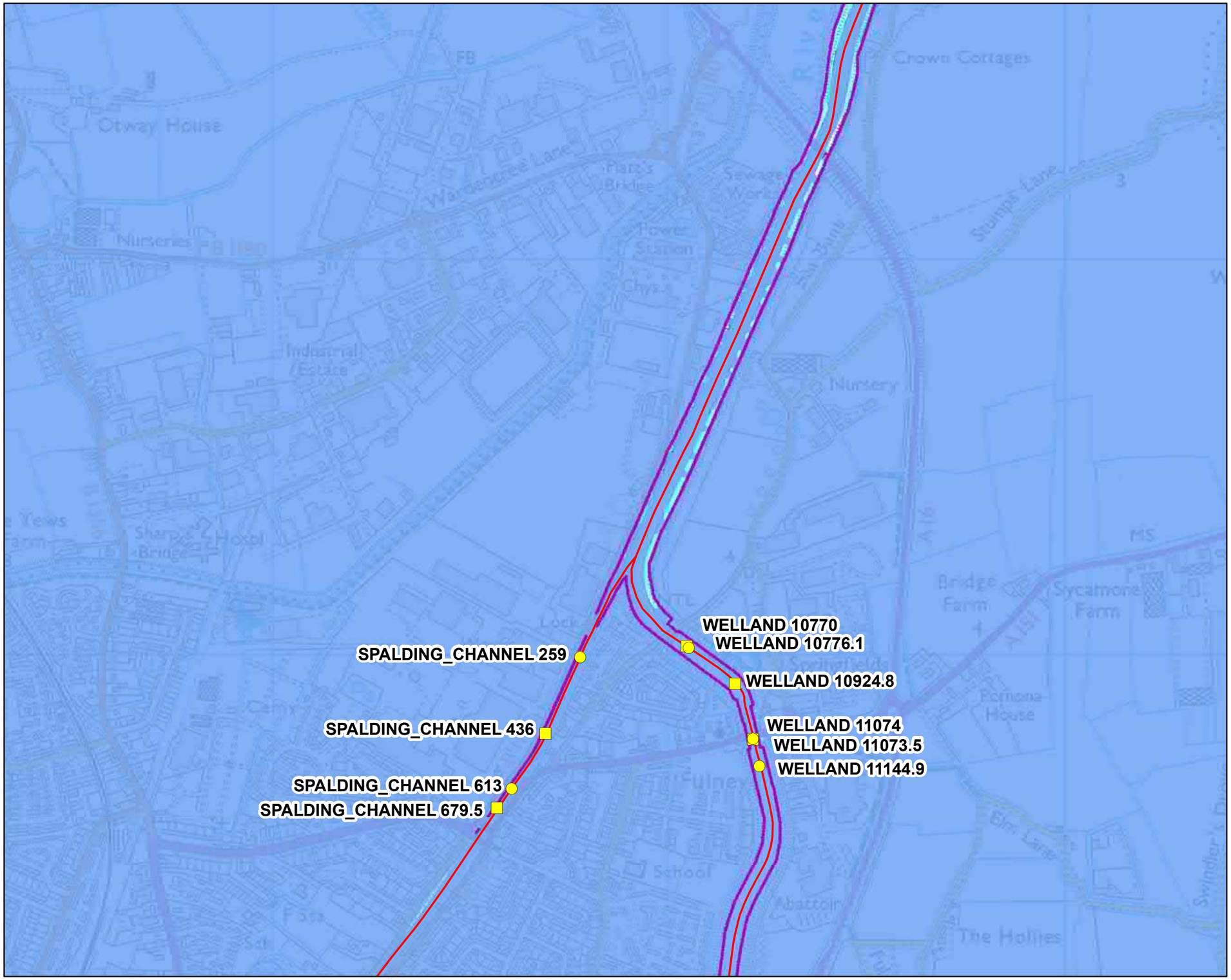


FOR Alastair Windler
Partnerships and Strategic Overview Team Leader - Welland and Nene

Direct dial 02030253535
Direct e-mail PSOWN@environment-agency.gov.uk

Enc.
Flood Map
Modelled Fluvial Levels and Flows Data Sheet
Estimated Tide Levels

Flood Map centred on TF 25867 24417 - created September 2018 [Ref: CCN-2018-99171]



Environment Agency

Scale 1:10,000

N

Legend

- Model Level
- Model Flows
- Main River
- Raised Defences
- Flood Storage Areas
- Area at Risk of Flooding from Rivers or The Sea
- Extreme Flood Outline

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.

- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Partnerships and Strategic Overview Team, Kettering

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Datasheet [Ref: CCN-2018-99171] Model Name: Welland Model Date: 2016

Fluvial Flood Levels (mODN)

The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

			Annual Exceedance Probability - Maximum Water Levels (mODN)										
Node Label	**Easting**	**Northing**	**50% (1 in 2)**	**20% (1 in 5)**	**10% (1 in 10)**	**5% (1 in 20)**	**2% (1 in 50)**	**1.33% (1 in 75)**	**1% (1 in 100)**	**1% (1 in 100) inc 20% Climate Change**	**0.5% (1 in 200)**	**0.1% (1 in 1000)**	**0.1% (1 in 1000) inc 20% Climate Change**
SPALDING_CHANNEL 259	525779	323995	3.70	4.00	4.17	4.45	4.51	4.52	4.52	4.68	4.53	4.56	4.68
SPALDING_CHANNEL 613	525605	323662	3.70	4.00	4.17	4.45	4.51	4.52	4.52	4.68	4.53	4.55	4.68
WELLAND 10776.1	526053	324019	3.64	3.90	4.10	4.36	4.38	4.41	4.43	4.68	4.44	4.45	4.68
WELLAND 11073.5	526216	323788	3.65	3.91	4.10	4.36	4.38	4.41	4.43	4.68	4.44	4.45	4.68
WELLAND 11144.9	526232	323719	3.65	3.91	4.10	4.36	4.39	4.42	4.44	4.68	4.45	4.46	4.68

Fluvial Flood Flows (m^3/s)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m^3/s).

			Annual Exceedance Probability - Maximum Flows (m^3/s)										
Node Label	**Easting**	**Northing**	**50% (1 in 2)**	**20% (1 in 5)**	**10% (1 in 10)**	**5% (1 in 20)**	**2% (1 in 50)**	**1.33% (1 in 75)**	**1% (1 in 100)**	**1% (1 in 100) inc 20% Climate Change**	**0.5% (1 in 200)**	**0.1% (1 in 1000)**	**0.1% (1 in 1000) inc 20% Climate Change**
SPALDING_CHANNEL 436	525690	323802	0.71	1.06	0.91	1.06	1.03	1.15	1.17	1.65	1.10	1.07	1.93
SPALDING_CHANNEL 679.5	525567	323613	1.30	1.99	1.77	2.06	1.93	2.24	2.31	3.19	2.18	2.06	3.61
WELLAND 10770	526048	324023	74.58	91.64	102.46	116.08	121.43	121.70	123.79	124.12	122.86	123.37	236.17
WELLAND 10924.8	526170	323927	74.06	89.60	100.87	115.72	118.85	119.81	121.38	123.20	120.56	120.49	119.34
WELLAND 11074	526216	323788	73.88	89.28	100.54	115.25	118.58	119.51	123.31	124.59	121.86	124.52	119.07

Tidal Level Location Map
Lincolnshire & Northamptonshire Area



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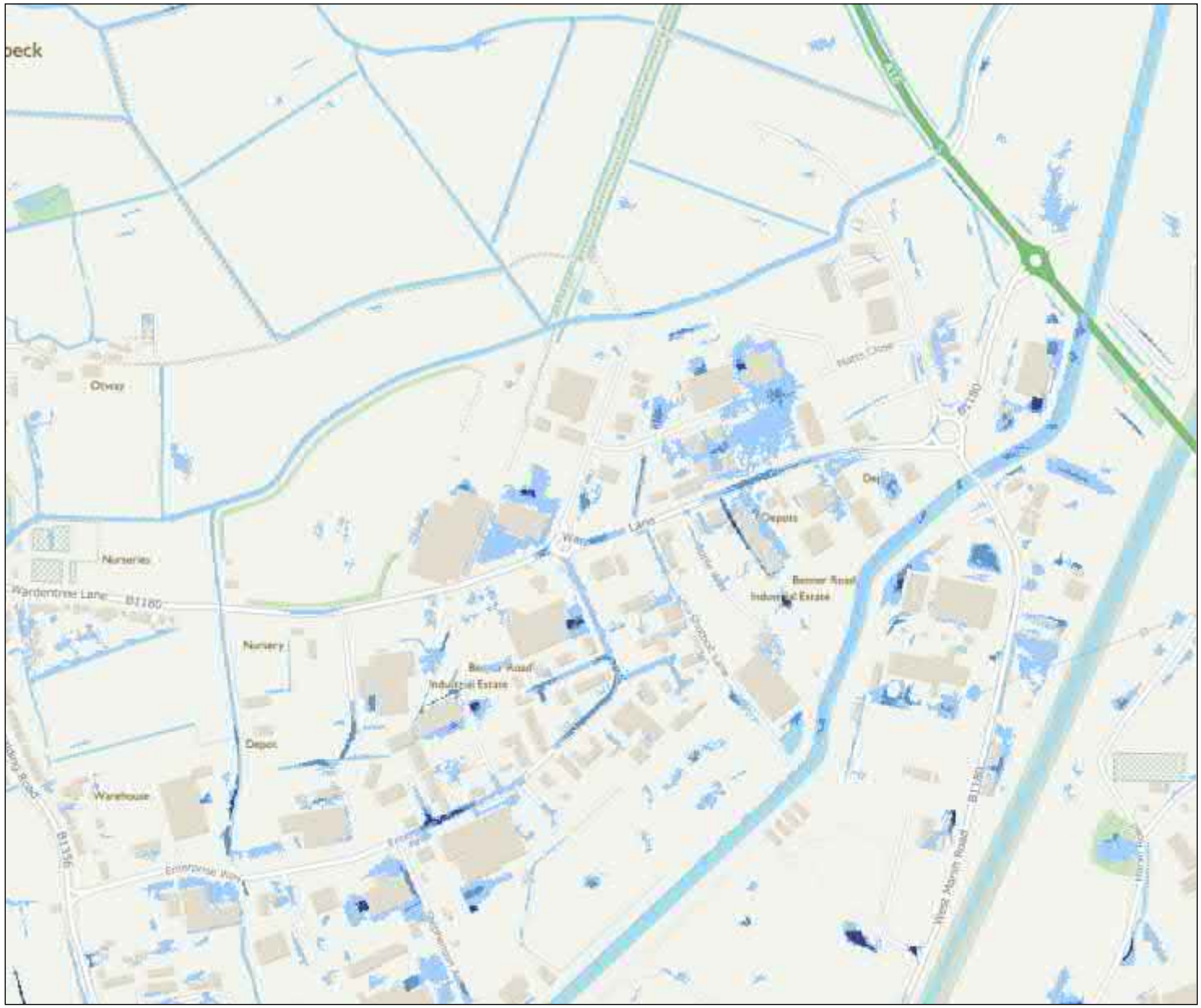
Tidal Water Levels for the South Humber, East Coast and The Wash

The table below shows still water levels for locations, from the above location map, around the South Humber Estuary, East Coast and The Wash. It is important to note the following:

- The base date for the data is 2014 for the South Humber and 2006 for the East Coast and The Wash.
- The data are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- The water level quoted is the 'Best Estimate' water level. Depending on the use of the data it may be necessary to carry out sensitivity testing. Upper and Lower 95% confidence bandings are available upon request.
- Levels for other annual chance scenarios are available if required.

Ref	Location	Easting	Northing	Annual Chance (1 in x) of Tide Level					
				metres ODN					
				1	10	50	100	200	1000
HUMBER									
H030	Tetney	535420	403180	3.94	4.29	4.56	4.69	4.82	5.15
H050	Buck Beck	532700	406580	4.03	4.36	4.62	4.74	4.87	5.18
H060	Grimsby	527878	411346	4.10	4.43	4.70	4.82	4.95	5.27
H080	Haborough Marsh	520790	415740	4.26	4.61	4.88	5.01	5.14	5.47
H090	Immingham	519141	417449	4.26	4.61	4.88	5.01	5.14	5.47
H100	South Killingholme	518700	417120	4.41	4.77	5.05	5.18	5.32	5.66
H130	North Killingholme	516530	420000	4.51	4.87	5.15	5.28	5.42	5.77
H150	East Halton	514450	422870	4.59	4.96	5.25	5.39	5.53	5.89
H170	Goxhill	511970	425440	4.67	5.04	5.34	5.47	5.61	5.95
H200	New Holland	508020	424330	4.87	5.26	5.55	5.68	5.81	6.12
H210	Barrow Haven	506380	422620	4.92	5.31	5.60	5.73	5.86	6.17
H220	Ferriby	497550	421150	5.04	5.42	5.67	5.77	5.86	6.04
H230	Winterton	493420	422830	5.14	5.51	5.74	5.83	5.90	6.02
H250	Blacktoft	484247	424190	5.25	5.62	5.83	5.90	5.96	6.04
H270	Goole	474857	422960	5.46	5.85	6.07	6.15	6.21	6.29
East Coast									
~	Great Eau	545500	393800	3.80	4.19	4.46	4.57	4.69	4.96
~	Boygrift	553300	379800	3.84	4.24	4.53	4.65	4.77	5.05
~	Burgh Sluice	555190	358620	4.26	4.45	4.76	4.90	5.03	5.34
Wash									
~	Hobhole	536610	339940	4.82	5.30	5.64	5.78	5.93	6.27
~	Lawyers Sluice	540750	334550	4.84	5.32	5.66	5.80	5.95	6.29
~	West Lighthouse	549150	325750	4.88	5.37	5.71	5.86	6.01	6.35
~	Grand Sluice	532400	344500	4.88	5.33	5.65	5.78	5.93	~
~	Fosdyke Bridge	531700	332200	4.91	5.38	5.71	5.85	5.99	~
~	Marsh Road	526000	324000	5.04	5.44	5.73	5.85	5.98	~
~	Wisbech	546100	310000	4.83	5.25	5.53	5.66	5.78	~
~	Dog In Doublet	527300	299300	3.67	4.00	4.22	4.32	4.42	~

Risk of flooding from Surface Water CCN-2018-99171



Environment Agency

Scale 1:10,000

N
W E
S

Likelihood of flooding from Surface Water

- High (>= 3.3%)
- Medium (3.3% - 1%)
- Low (1% - 0.1%)
- Very Low

Likelihood of flooding from Surface Water

High:	Greater than or equal to 3.3% (1 in 30) chance in any given year
Medium:	Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
Low:	Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
Very Low:	Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on our website.

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). E-mail: enquires@environment-agency.gov.uk

Emma Rowlands
ERowlands@rsk.co.uk

Our ref: AN/2018/127982/01-L01
Your ref: 180910/GS22

Date: 13 September 2018

Dear Emma

Pre-planning enquiry for commercial development
Warden Tree Lane Spalding, Lincolnshire PE11 3ZN

Thank you for your recent enquiry, which was received on 06 September 2018. Having looked at your proposed scheme we have identified the following areas that we feel need to be addressed as part of a planning application and these are set out below in our Preliminary Opinion of your proposal.

Flood Risk
The proposed site lies within an area identified at risk of flooding, where the expected flood conditions are hazardous. The Environment Agency recommends that the proposal is accompanied by a Flood Risk Assessment (FRA) which contains evidence that appropriate mitigation measures, including flood resilience techniques, have been incorporated into the development. Please refer to the following document for information on flood resilience and resistance techniques to be included: 'Improving Flood Performance of New Buildings - Flood Resilient Construction' (Department for Communities and Local Government, 2007).

The site specific checklist for producing a FRA is here:
https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section

Further information on how to apply climate change can be found here:
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Product 4 which you have requested will provide the historic flood event outlines.

We no longer deal with surface water management of new development, the Lead Local Flood Authority may be able to assist you on the discharge rates.

Environment Agency
Nene House (Pytchley Lodge Industrial Estate),
Pytchley Lodge Road, Kettering, Northants, NN15 6JQ
Email: LNplanning@environment-agency.gov.uk

Customer services line: 03708 506 506
Calls to 03 numbers cost the same as calls to standard geographic numbers (i.e. numbers beginning with 01 or 02).

Cont/d..

The development is affected by Hazard Mapping which shows the consequences should a breach or overtopping of defences occur. Further information regarding depths and mitigation can be found here:
https://www.sholland.gov.uk/article/5307/Planning-Policy

The FRA should contain evidence to justify the chosen finished floor levels (FFL) of the development. FFL's should be raised as high as practicable for 'less vulnerable' development, but a minimum of 300mm above existing ground levels. Please note that single storey buildings should be built above the maximum flood depths. This information can be found in the Hazard Mapping. If this is not practicable then an area of safe refuge will need to be incorporated that is located about the maximum flood depths. Alternatively, an appropriate flood warning and evacuation strategy will need to be submitted to, and approved in writing by, the local planning authority (LPA).

Please note that we will need to see the minimum mitigation requirements set out above included as part of any formal planning application otherwise it is likely that we will object to the application on flood risk grounds.

The LPA will need to be satisfied that the proposed development is in accordance with all flood risk requirements of the National Planning Policy Framework.

Finally, we would support the recommendation of a FRA advising that the site owners will register with the free Floodline Warnings Direct Service. More information on this service can be found at the following link:
https://fwd.environment-agency.gov.uk/app/olr/home.

Review of Documentation and Further Work
We do have a voluntary charged-for service where we can provide more detailed pre-application advice. As part of this service we can provide a dedicated project manager to act as a single point of contact to coordinate any problems, data requests or review technical documents. Should you wish us to undertake a detailed review of any FRA (or any subsequent revision to take on the board our comments above) or want further advice to address these issues, we can do this as part of our charged service.

Please note that this response is based on the information you have provided at this time and if this changes in the future we would need to consider our position again.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Mrs Sharon Nolan
Sustainable Places Planning Adviser

Direct dial 020302 53525
Direct e-mail sharon.nolan@environment-agency.gov.uk

End

APPENDIX E
LINCOLNSHIRE COUNTY COUNCIL CORRESPONDENCE

Emma Rowlands

From: FloodRisk <FloodRisk@lincolnshire.gov.uk>
Sent: 19 September 2018 10:42
To: Emma Rowlands
Cc: Karen Bonnett; FOI; Michelle Banks
Subject: Flood risk enquiry - Wardentree Lane, Spalding (FOI - 47745775)

Morning Emma,

Thank you for your recent email enquiry to Lincolnshire County Council regarding the development on Wardentree Lane, Spalding. To answer your questions in sequence, please see the responses below in red text:

1. **Flooding records/maps**
   Are the council aware of any local flooding issues within the Spalding area? This request has been related to the area of concern being Wardentree Lane and not Spalding as a generic larger area. As part of our Flood Risk Assessment we will be documenting any recorded incidents of flooding so any records/anecdotal evidence that the council may have, would be of great help. In particular we would be interested to hear of any reported incidents of surface water, highway or groundwater flooding.
   As Lead Local Flood Authority (LLFA) for Lincolnshire County Council (LCC), we are responsible for managing the flood risk from local sources; that is, surface water, ground water and ordinary watercourses. However, if there is a flood we will investigate in accordance with Section 19 of the Flood & Water Management Act, no matter what the source. The outcomes of these Section 19 investigations are available on the LCC website here. As you will see, there are no Section 19 investigations for Wardentree Lane, Spalding. You should be aware that our records only go back as far as April 2012, when LCC acquired it's Section 19 duties. Further historical flood information might be available from the Environment Agency (EA) or South Holland District Council (SHDC).

2. **Are there any surface water flood maps available and if so please can we obtain a copy?**
   For your information, a good source of flood risk information is available via the GOV.UK website: https://flood-warning-information.service.gov.uk/long-term-flood-risk/. Flood risk maps are available there from multiple sources; the website gives advice about what limitations there are with the risk maps and what they should/shouldn't be used for. There are also more links and/or information about managing flood risk. The maps are provided by the EA for an indication of flood risk to an area, they should not be used to identify specific risk to an individual property.

3. **Flood Mitigation Measures**
   Can you provide information on any required flood mitigation measures you may suggest for development in this area, if deemed necessary.
   It is up to the developer to produce a Flood Risk Assessment (FRA) from all sources to and from the site and any mitigation measures that are required to reduce flood risk.

4. **Surface Water Drainage Strategy**
   We would be grateful if you could please provide your pre-planning advice on the surface water drainage strategy for this site? Are there any particular local requirements that the council wish to raise, relating to the proposed drainage strategy for the area, such as:

a. **Any discharge restrictions**
You will need to discuss this matter with the relevant surface water receiving body – Anglian Water/Internal Drainage Board (IDB)

b. **Use of SuDS features – what types and level of adoption**
LCC SuDS information and guidance can be viewed on the LCC website here:
https://www.lincolnshire.gov.uk/transport-and-roads/strategy-policy-and-licences/control-of-new-development-affecting-the-highway/development-road-and-sustainable-drainage-specification-and-construction/87183.article

c. **Level of drainage detail required at the planning stage**
You will need to discuss this matter with the relevant Local Planning Authority (LPA) which is SHDC

d. **Any interim guidance for proposed drainage on new developments in this area?**
It is the responsibility of the developer to produce a FRA from all sources to and from the site and any mitigation measures. All supporting information and guidance that we can provide can be viewed on the following LCC website link:
https://www.lincolnshire.gov.uk/transport-and-roads/strategy-policy-and-licences/control-of-new-development-affecting-the-highway/development-road-and-sustainable-drainage-specification-and-construction/87183.article

5. **Following the recent publication of the new climate change allowances from the Environment Agency, please can you confirm what Lincolnshire County Council consider to be an appropriate climate change allowance for developments in this area.**
   1 in 100 year + 40%

6. **If you have any formal pre-planning procedure i.e. forms, fees etc, please can you provide details.**
   As the development is within the SHDC area, you would be advised to liaise with the relevant LPA on this matter.

Regards,

Andrew Baptie
Flood Risk Officer
Office Number = 01522 553050

Lead Local Flood Authority,
Lincolnshire County Council,
Lancaster House,
36 Orchard Street,
Lincoln.
LN1 1XX

Lincolnshire COUNTY COUNCIL

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APPENDIX F
WELLAND AND DEEPINGS INTERNAL DRAINAGE BOARD CORRESPONDENCE

Emma Rowlands

From: Nick Morris <Nick@wellandidb.org.uk>
Sent: 25 September 2018 16:05
To: Emma Rowlands
Cc: Craig Shinkin
Subject: RE: Enquiry re. IDB constraints for site in Warden tree Lane, Spalding
Attachments: Scraggs Dyke 1100 year level.pdf

Good Afternoon Emma

Further to our telephone conversation yesterday I write to confirm a few points:

The Boards "Scraggs Dyke" runs along the eastern boundary of the site (see attached plan). As a Boards drain it is afforded the protection of byelaws and the most pertinent one to any site layout is the 9 metres byelaw. No development will be permitted within 9 metres of the top edge of the watercourse. The Board need to access the drain for regular maintenance and may need to undertake improvements in the future.

The 1:100 year modelled water level in Scraggs Dyke adjacent to the site is approximately 1.90m ODN. This dyke connects to the Blue Gowt Drain which flows to the Pinchbeck Marsh
Pumping Stations which then pump the water into the Blue Gowt Outfall drain. This watercourse gravitates into the River Glen just upstream of Surfleet Reservoir.

I am not aware of any flood events in this area.

In line with current guidance the use of SUDS systems should be considered as the first approach to deal with surface water discharges from the site. The Board would be prepared to accept flows at its accepted Greenfield rate of 1.4 litres/sec/ha into its system subject to completion of the relevant consent application form and agreement of technical details. However I believe that this site may be a serviced plot with a connection into the Anglian Water system already available. This would need to be confirmed with the site owner. If a connection is already available then the Board may accept a flow greater than the Greenfield Rate subject, again, to an application, agreement of technical details and also payment of a Development Contribution. The agreement of Anglian Water and Lincolnshire County Council in their role as Lead Local Flood Authority would also be required.
The Boards Riddington Pumping Station at Pinchbeck Marsh was designed and constructed to accommodate additional flows into the system as a result of future industrial development in this area.

A copy of the Boards current Development Levies can be supplied if required.

I hope that this information helps.

Best wishes,

Nick

From: Debra Mills
Sent: 14 September 2018 11:43
To: Nick Morris <Nick@wellandidb.org.uk>
Cc: Craig Shinkin <Craig@wellandidb.org.uk>
Subject: FW: Enquiry re. IDB constraints for site in Warden tree Lane, Spalding

From: Emma Rowlands [mailto:ERowlands@rsk.co.uk]
Sent: 14 September 2018 10:43
To: info <info@wellandidb.org.uk>
Subject: Enquiry re. IDB constraints for site in Warden tree Lane, Spalding

Good Morning,

We are Engineering Consultants who have been asked to produce a flood risk assessment for a site in the Warden Tree Lane, Spalding area.

The address for the site is:
Warden Tree Lane
Spalding
PE11 3ZN

OS Grid ref : 525428, 325165

I have also attached a map of the site location.

Please can you provide comments on any IDB constraints within this site area, regarding flood risk and drainage, including modelled levels and known historical flood events.

At this stage, we have not made an assessment of potential surface water discharge from the site, but we would appreciate your thoughts on potential connections into any IDB watercourse and what restrictions this would have.

We have also contacted the Environment Agency to obtain flood level data for the site and are awaiting their response.

If you need any additional information, please do not hesitate to contact us.

Many thanks for your time.

Kind regards,

Emma

Emma Rowlands
Graduate Hydrologist

Debra Mills
Finance & Ratings Officer

Welland & Deepings
Internal Drainage Board

Deeping House
Welland Terrace
Spalding
PE11 2TD

www.wellandidb.org.uk
Tel: 01775 725861
Fax: 01775 767689

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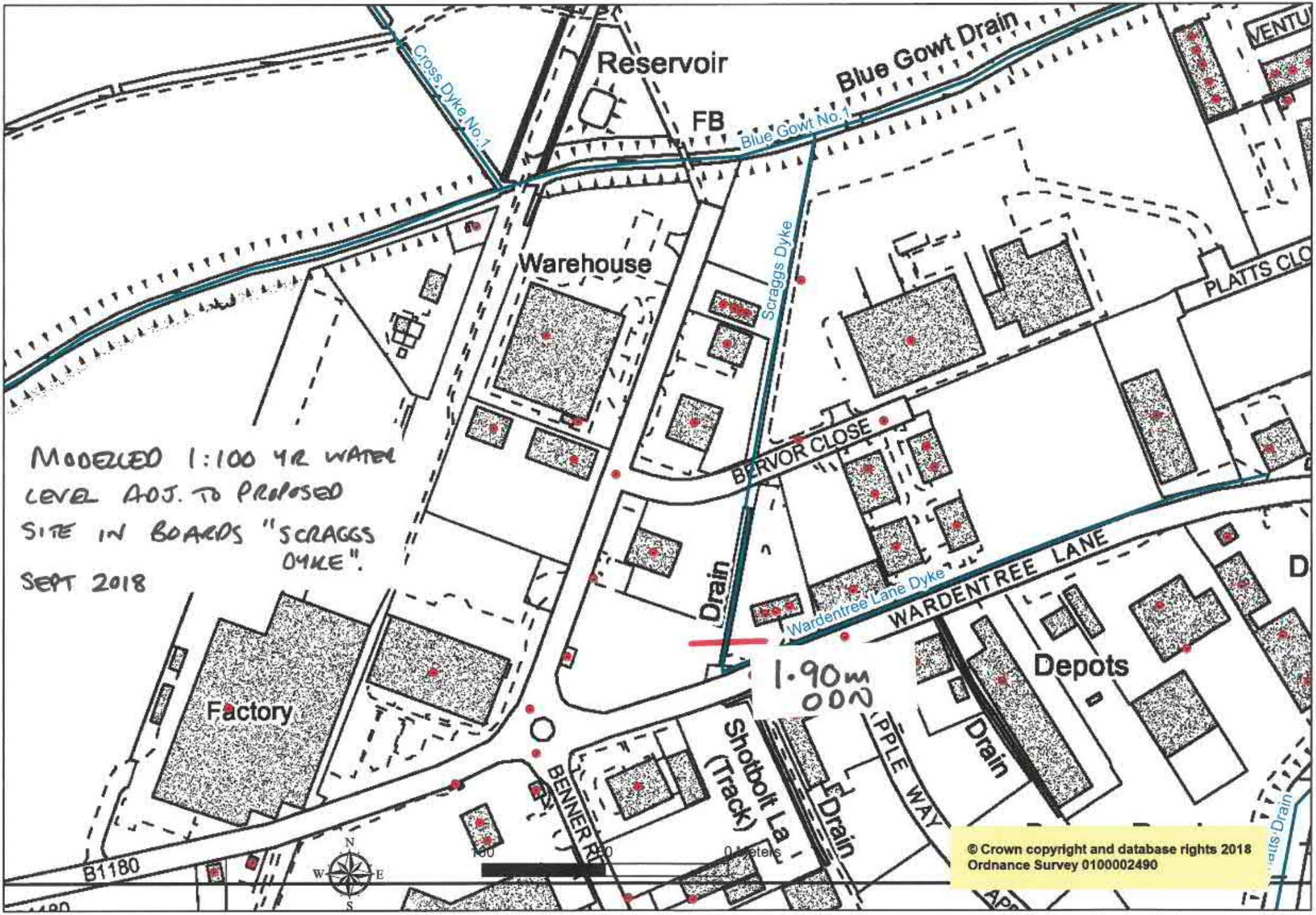
Nick Morris
Operations Engineer

Welland & Deepings
Internal Drainage Board

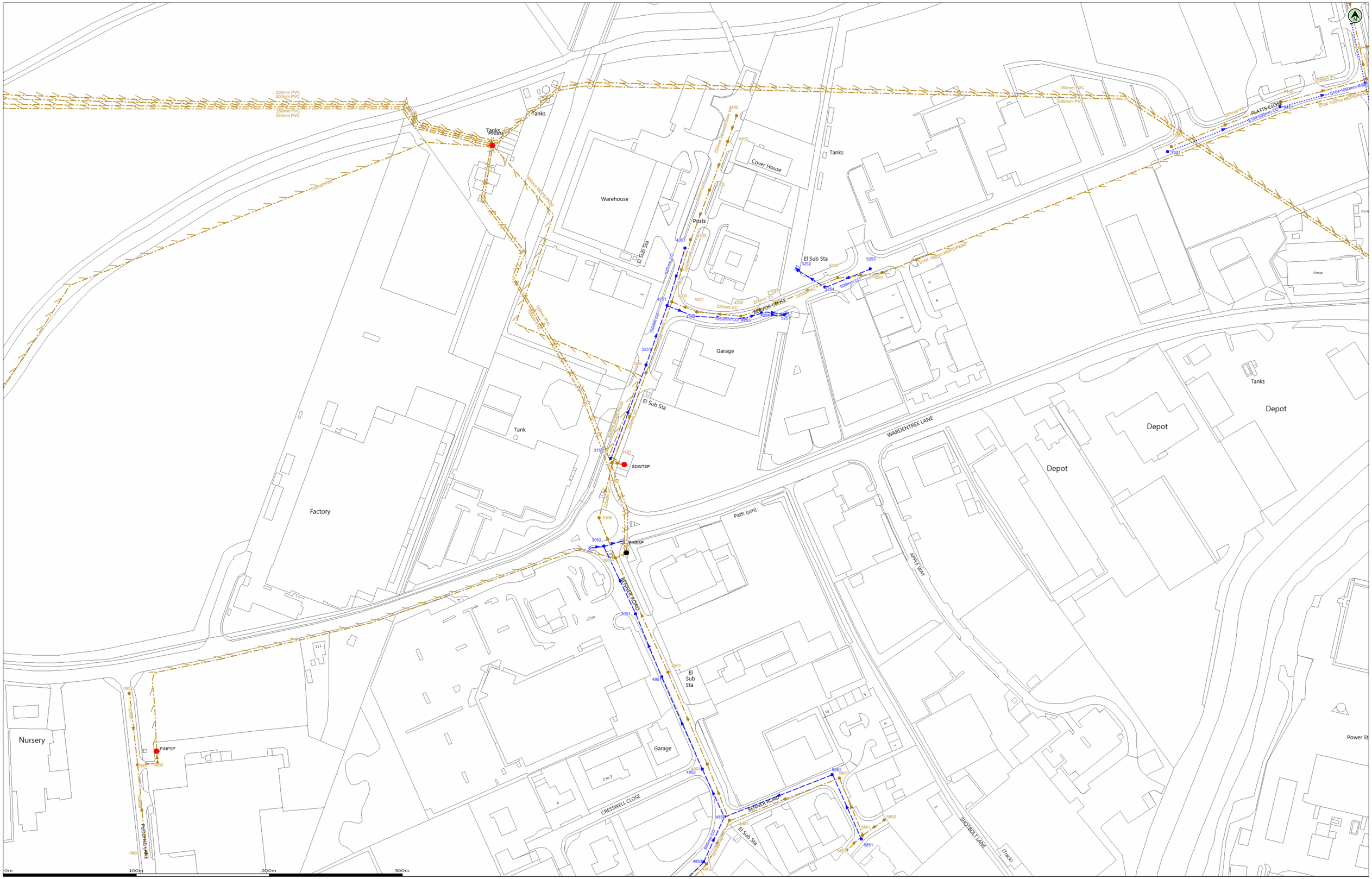
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Reservoir
FB
Blue Gowt Drain
Blue Gowt No.1
Cross Dyke No.1
Warehouse
Scraggs Dyke
PLATTS CLO
BERVOR CLOSE
MODELLED 1:100 YR WATER LEVEL ADJ. TO PROPOSED SITE IN BOARDS "SCRAGGS DYKE".
SEPT 2018
Drain
Wardentree Lane Dyke
WARDENTREE LANE
1.90m
000
Depots
Factory
Shotbolt La (Track)
BENNER RD
Drain
Drain
B1180
N
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Ordnance Survey 0100002490

APPENDIX G
ANGLIAN WATER SEWER RECORDS



(c) Crown copyright and database rights 2018 Ordnance Survey 100022432 | Date: 14/09/18 | Scale: 1:1250 | Map Centre: 525428,325165 | Data updated: 01/06/18 | Our Ref: 279631 - 1 | Wastewater Plan A1

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2018 Ordnance Survey 100022432,This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer	Outfall*	Sewage Treatment Works	
Surface Sewer		Public Pumping Station	
Combined Sewer		Decommissioned Pumping Station	
Final Effluent	Inlet*		
Rising Main*			
Private Sewer*	Manhole*		
Decommissioned Sewer*			

*(Colour denotes effluent type)

cnewlands@rsk.co.uk

Warden Tree Lane

love every drop anglianwater

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0800	525022	324854	F	-	-	-
0900	525031	324922	F	-	-	-
0901	525016	324921	F	3.62	0.95	2.67
0902	525010	324974	F	3.48	1.8	1.68
3001	525375	325076	F	3.06	-0.03	3.09
3100	525363	325106	F	-	-	-
3101	525373	325148	F	-	-	-
3200	525398	325215	F	-	-	-
4200	525417	325268	F	-	-	-
4201	525436	325261	F	-	-	-
4202	525469	325258	F	-	-	-
4203	525496	325267	F	-	-	-
4300	525431	325315	F	-	-	-
4301	525446	325352	F	-	-	-
4302	525459	325389	F	-	-	-
4400	525466	325408	F	-	-	-
4801	525461	324879	F	3.098	0.908	2.19
4802	525444	324846	F	-	-	-
4901	525414	324990	F	3.09	0.379	2.711
4902	525444	324921	F	3.08	0.695	2.385
5200	525542	325286	F	-	-	-
5201	525575	325290	F	-	-	-
5801	525561	324868	F	3.179	1.779	1.4
5802	525577	324879	F	3.197	1.917	1.28
5803	525549	324857	F	3.157	1.897	1.26
5901	525543	324911	F	3.139	1.449	1.69
7300	525793	325385	F	-	-	-
8400	525875	325418	F	-	-	-
9400	525939	325436	F	-	-	-
9401	525934	325459	F	-	-	-
3051	525390	325034	S	3.11	1.29	1.82
3052	525366	325085	S	3.18	1.21	1.97
3151	525371	325151	S	-	-	-
3251	525398	325221	S	-	-	-
4251	525414	325265	S	-	-	-
4252	525434	325258	S	-	-	-
4253	525471	325256	S	-	-	-
4254	525485	325260	S	-	-	-
4351	525427	325309	S	-	-	-
4851	525457	324882	S	3.135	1.475	1.66
4853	525441	324848	S	-	-	-
4951	525410	324987	S	3.041	1.361	1.68
4952	525440	324918	S	3.082	1.412	1.67
5251	525502	325259	S	-	-	-
5252	525512	325292	S	-	-	-
5253	525567	325293	S	-	-	-
5254	525532	325279	S	-	-	-
5851	525560	324865	S	3.179	2.069	1.11
5951	525538	324913	S	3.06	1.79	1.27
7351	525790	325381	S	-	-	-
8451	525874	325415	S	-	-	-
9451	525938	325432	S	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

APPENDIX H
CLIMATE CHANGE CALCULATIONS

IH 124 Mean Annual Flood

Input

Return Period (years)	100	SAAR (mm)	560	Urban	0.000
Area (ha)	0.590	Soil	0.300	Region Number	Region 5

Results	**l/s**
QBAR Rural	1.3
QBAR Urban	1.3
Q100 years	4.8
Q1 year	1.2
Q2 years	1.2
Q5 years	1.7
Q10 years	2.2
Q20 years	2.8
Q25 years	3.1
Q30 years	3.2
Q50 years	3.8
Q100 years	4.8
Q200 years	5.7
Q250 years	5.9
Q1000 years	7.8

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required area. The ICP SUDS tab will do this automatically.

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APPENDIX I
DRAINAGE CALCULATIONS

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 2488 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.337	0.337	0.0	1.0	1.0	157.1	O K
30 min Summer	0.387	0.387	0.0	1.0	1.0	180.3	O K
60 min Summer	0.443	0.443	0.0	1.1	1.1	206.4	O K
120 min Summer	0.505	0.505	0.0	1.1	1.1	234.9	O K
180 min Summer	0.542	0.542	0.0	1.2	1.2	252.4	O K
240 min Summer	0.569	0.569	0.0	1.2	1.2	264.8	O K
360 min Summer	0.606	0.606	0.0	1.2	1.2	281.9	O K
480 min Summer	0.630	0.630	0.0	1.3	1.3	293.1	O K
600 min Summer	0.646	0.646	0.0	1.3	1.3	300.9	O K
720 min Summer	0.658	0.658	0.0	1.3	1.3	306.5	O K
960 min Summer	0.669	0.669	0.0	1.3	1.3	311.5	O K
1440 min Summer	0.671	0.671	0.0	1.3	1.3	312.1	O K
2160 min Summer	0.654	0.654	0.0	1.3	1.3	304.4	O K
2880 min Summer	0.637	0.637	0.0	1.3	1.3	296.5	O K
4320 min Summer	0.586	0.586	0.0	1.2	1.2	272.6	O K
5760 min Summer	0.541	0.541	0.0	1.2	1.2	252.0	O K
7200 min Summer	0.502	0.502	0.0	1.1	1.1	233.9	O K
8640 min Summer	0.468	0.468	0.0	1.1	1.1	217.6	O K
10080 min Summer	0.436	0.436	0.0	1.1	1.1	202.7	O K
15 min Winter	0.378	0.378	0.0	1.0	1.0	176.0	O K
30 min Winter	0.434	0.434	0.0	1.1	1.1	202.1	O K
60 min Winter	0.497	0.497	0.0	1.1	1.1	231.4	O K
120 min Winter	0.566	0.566	0.0	1.2	1.2	263.7	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	184.995	27
30 min Summer	106.458	42
60 min Summer	61.263	72
120 min Summer	35.254	130
180 min Summer	25.517	190
240 min Summer	20.288	250
360 min Summer	14.684	368
480 min Summer	11.675	488
600 min Summer	9.772	606
720 min Summer	8.450	726
960 min Summer	6.684	964
1440 min Summer	4.803	1442
2160 min Summer	3.451	1864
2880 min Summer	2.729	2228
4320 min Summer	1.914	3024
5760 min Summer	1.488	3856
7200 min Summer	1.224	4680
8640 min Summer	1.043	5456
10080 min Summer	0.912	6344
15 min Winter	184.995	27
30 min Winter	106.458	41
60 min Winter	61.263	70
120 min Winter	35.254	128

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Summary of Results for 100 year Return Period (+20%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
180 min Winter	0.609	0.609	0.0	1.3	1.3	283.5	O K
240 min Winter	0.640	0.640	0.0	1.3	1.3	297.8	O K
360 min Winter	0.682	0.682	0.0	1.3	1.3	317.5	O K
480 min Winter	0.710	0.710	0.0	1.4	1.4	330.7	O K
600 min Winter	0.731	0.731	0.0	1.4	1.4	340.1	O K
720 min Winter	0.745	0.745	0.0	1.4	1.4	347.0	O K
960 min Winter	0.760	0.760	0.0	1.4	1.4	353.9	O K
1440 min Winter	0.768	0.768	0.0	1.4	1.4	357.5	O K
2160 min Winter	0.754	0.754	0.0	1.4	1.4	351.0	O K
2880 min Winter	0.731	0.731	0.0	1.4	1.4	340.3	O K
4320 min Winter	0.669	0.669	0.0	1.3	1.3	311.4	O K
5760 min Winter	0.611	0.611	0.0	1.3	1.3	284.3	O K
7200 min Winter	0.558	0.558	0.0	1.2	1.2	259.6	O K
8640 min Winter	0.509	0.509	0.0	1.1	1.1	237.1	O K
10080 min Winter	0.465	0.465	0.0	1.1	1.1	216.4	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
180 min Winter	25.517	188
240 min Winter	20.288	246
360 min Winter	14.684	362
480 min Winter	11.675	480
600 min Winter	9.772	596
720 min Winter	8.450	712
960 min Winter	6.684	942
1440 min Winter	4.803	1394
2160 min Winter	3.451	2036
2880 min Winter	2.729	2332
4320 min Winter	1.914	3240
5760 min Winter	1.488	4152
7200 min Winter	1.224	5048
8640 min Winter	1.043	5896
10080 min Winter	0.912	6768

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Rainfall Details

Rainfall Model	FEH	F (1km)	2.493
Return Period (years)	100	Summer Storms	Yes
Site Location	GB 526050 325200 TF 26050 25200	Winter Storms	Yes
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.304	Cv (Winter)	0.840
D2 (1km)	0.286	Shortest Storm (mins)	15
D3 (1km)	0.226	Longest Storm (mins)	10080
E (1km)	0.313	Climate Change %	+20

Time / Area Diagram

Total Area (ha) 0.456

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.152	4-8	0.152	8-12	0.152

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Model Details

Storage is Online Cover Level (m) 2.000

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	490.0	0.0	2.600	0.0	0.0
0.200	490.0	0.0	2.800	0.0	0.0
0.400	490.0	0.0	3.000	0.0	0.0
0.600	490.0	0.0	3.200	0.0	0.0
0.800	490.0	0.0	3.400	0.0	0.0
0.801	0.0	0.0	3.600	0.0	0.0
1.200	0.0	0.0	3.800	0.0	0.0
1.400	0.0	0.0	4.000	0.0	0.0
1.600	0.0	0.0	4.200	0.0	0.0
1.800	0.0	0.0	4.400	0.0	0.0
2.000	0.0	0.0	4.600	0.0	0.0
2.200	0.0	0.0	4.800	0.0	0.0
2.400	0.0	0.0	5.000	0.0	0.0

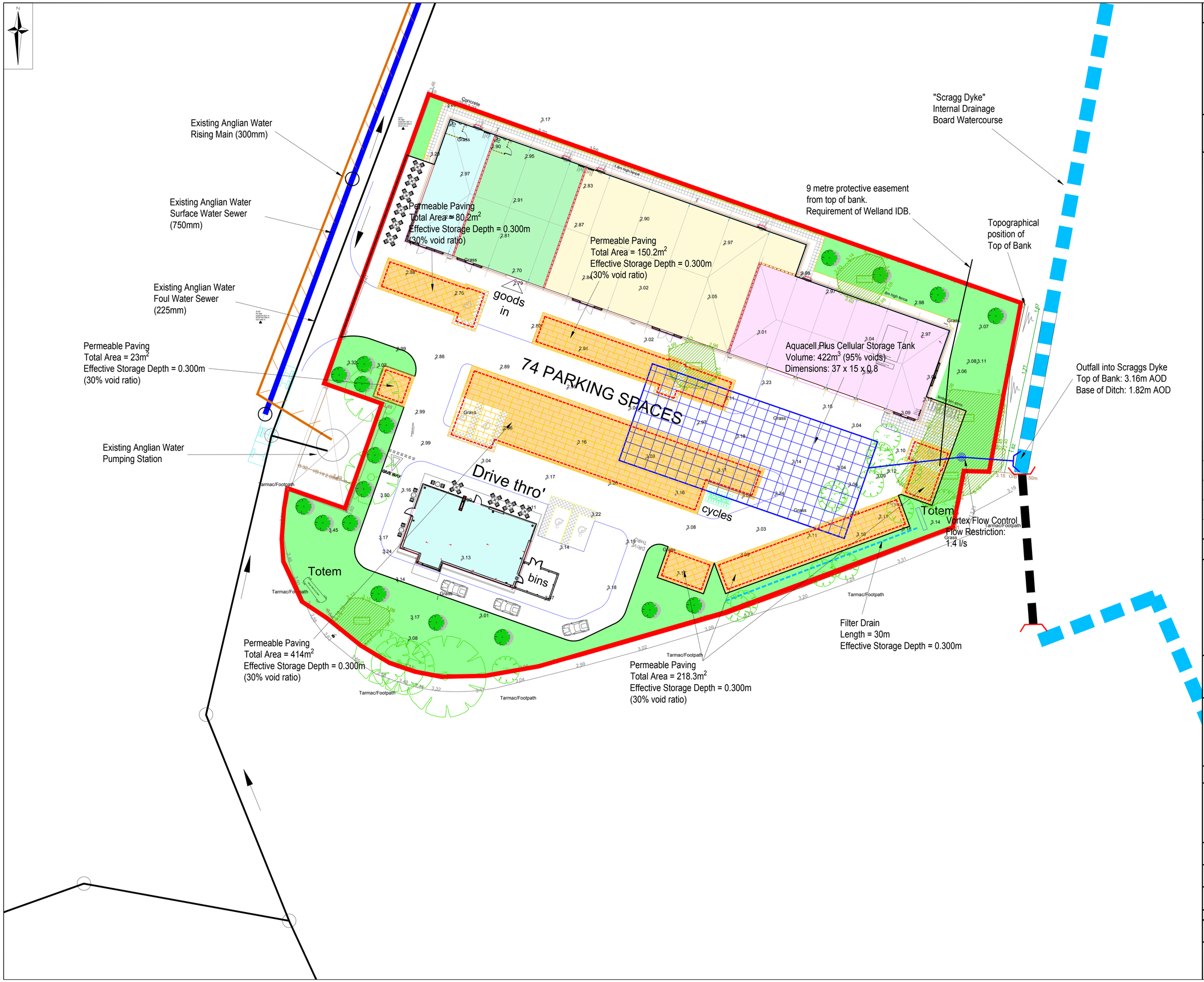
Hydro-Brake® Outflow Control

Design Head (m) 0.800 Hydro-Brake® Type Md6 SW Only Invert Level (m) 0.000
Design Flow (l/s) 1.4 Diameter (mm) 53

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	1.8	3.000	2.8	7.000	4.2
0.200	0.9	1.400	1.9	3.500	3.0	7.500	4.4
0.300	0.9	1.600	2.0	4.000	3.2	8.000	4.5
0.400	1.0	1.800	2.2	4.500	3.4	8.500	4.7
0.500	1.1	2.000	2.3	5.000	3.6	9.000	4.8
0.600	1.2	2.200	2.4	5.500	3.8	9.500	4.9
0.800	1.4	2.400	2.5	6.000	3.9		
1.000	1.6	2.600	2.6	6.500	4.1		

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APPENDIX J
INDICATIVE SURFACE WATER DRAINAGE STRATEGY



CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

KEY

- Development Area
- Existing Surface Water Land Drainage Syatem - Scragg's Dyke
- Existing Surface Water Culvert
- Existing Rising Main
- Existing Pumping Station
- Existing Foul Sewer
- Existing Surface Water Sewer (750mm)
- Proposed SW Carrier Pipe
- Proposed Channel Drainage
- Aquacell Cellular Storage
- Permeable Pavement Construction (Type C - No infiltration)
- Impermeable Membrane

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P04	03.12.2018	Revised Layout 17647-207-B SITE PLAN	BD	MC	MC
P03	06.11.2018	Topographical Survey Added	BD	MC	MC
P02	24.10.2018	Updated Layout 17647_115 SITE PLAN OPTION 15	BD	MC	MC
P01	08.10.2018	Preliminary Issue.	BD	MC	MC

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Web: www.rsk.co.uk

Client

HPV (Warden Tree Lane) Ltd

Project Title

WARDEN TREE LANE
SPALDING
LINCOLNSHIRE

Status: FOR PLANNING

Drawing Title

PRELIMINART DRAINAGE STRATEGY

Drawn	Date	Checked	Date	Approved	Date
BD	03.12.18	MC	03.12.18	MC	03.12.18

Scale	Orig Size	Dimensions	Revision
1:250	A1		P04

Drawing File: 890253-RSK-H-ALL-24-10-18-PRELIMDRAINAGESTRATEGY REV C.DWG

Project No.	Originator	Unit	Site Area	Series	Number	Sheet
890253	RSK	A1				

Scale 1:250
0 2.5 5 7.5 10 12.5m