Resilience and Flood Risk

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Parkside Crescent, Spalding
Flood Risk Assessment

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Version 2.0
RAB: 1172L

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Action	Signature	Date
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Checked	P. Batty	22.01.2016
Approved	R.A. Burton	22.01.2016

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1.0 Introduction

This Flood Risk Assessment has been prepared by RAB Consultants, in support of a proposal for a residential planning application at land off Parkside Crescent, Spalding.

The Planning Practice Guidance that supports the National Planning Policy Framework (NPPF) requires a Flood Risk Assessment to be carried out to ensure that new development is safe from flooding and will not increase the risk of flooding elsewhere.

2.0 Site Location

The proposed development site is located at Parkside Crescent, Spalding, Lincolnshire, PE11 1RA; NGR: TF 24427 23147 (Figure 1 and Appendix A).

Pedestrian and vehicular access to the site is available direct from Parkside Crescent, with an additional pedestrian access from Park Road.

3.0 Site History and Development Proposals

The existing site comprises 8 garages with hardstanding, a surrounding lawn and natural areas. The total site area is approximately 3125m^2 of which approximately 100m^2 is occupied by garages, 525m^2 is hardstanding and the remaining 2500m^2 is permeable.

Planning permission is being sought to construct 10 dwellings, configured as 2 blocks of 5 terraced houses. The development will also include an access road, 20 parking spaces, paths, patios and gardens. The total building footprint will be approximately 395m^2. The area of access road and parking spaces will be approximately 480m^2 and 265m^2 respectively.



FIGURE 1 – VIEW OF THE EXISTING SITE (GOOGLE MAPS – STREET VIEW)

4.0 Flood Risk

4.1 Sequential test

According to the Environment Agency's online flood map the site lies in Flood Zone 3 (land having a 1 in 100 (1%) or greater annual probability (a.p.) of river flooding).

The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas.

NPPF Planning Practice Guidance Table 2 confirms the 'Flood risk vulnerability classification' of a site, depending upon the proposed usage. This classification is subsequently applied to Table 3 'Flood risk vulnerability and Flood Zone compatibility' to determine whether:

- The proposed development is suitable for the Flood Zone in which it is located; and
- Whether an Exception Test is required for the proposed development.

The proposed development is classed as a 'more vulnerable' development in accordance with Table 2. The development is therefore appropriate for the Flood Zone, however both a sequential test and exception test are required. The report is included in Appendix C.

4.2 Fluvial and Coastal Flood Risk

The proposed development site lies approximately 0.75km west of the River Welland, which flows to the north-east through Spalding. The River Welland, Spalding and large areas of Lincolnshire around the Wash are strongly influenced by coastal flooding. Spalding however benefits from a flood defence scheme.

A flood data request was made to the Environment Agency. In response, the Environment Agency report that modelled data is for in-channel levels, which will be high due to the flood defences (Appendix D). They advise that the FRA should assess the flood risk mitigation required from the hazard mapping included in the South Holland Strategic Flood Risk Assessment SFRA; specifically from the residual depth maps including climate change (2115 maps). This includes the sea, main rivers, Internal Drainage Board systems and flood defences.

The 1% a.p. fluvial / 0.5% a.p. coastal with climate change residual flood map shows no flooding at the proposed development site (Appendix D). This reflects the consequences arising from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.

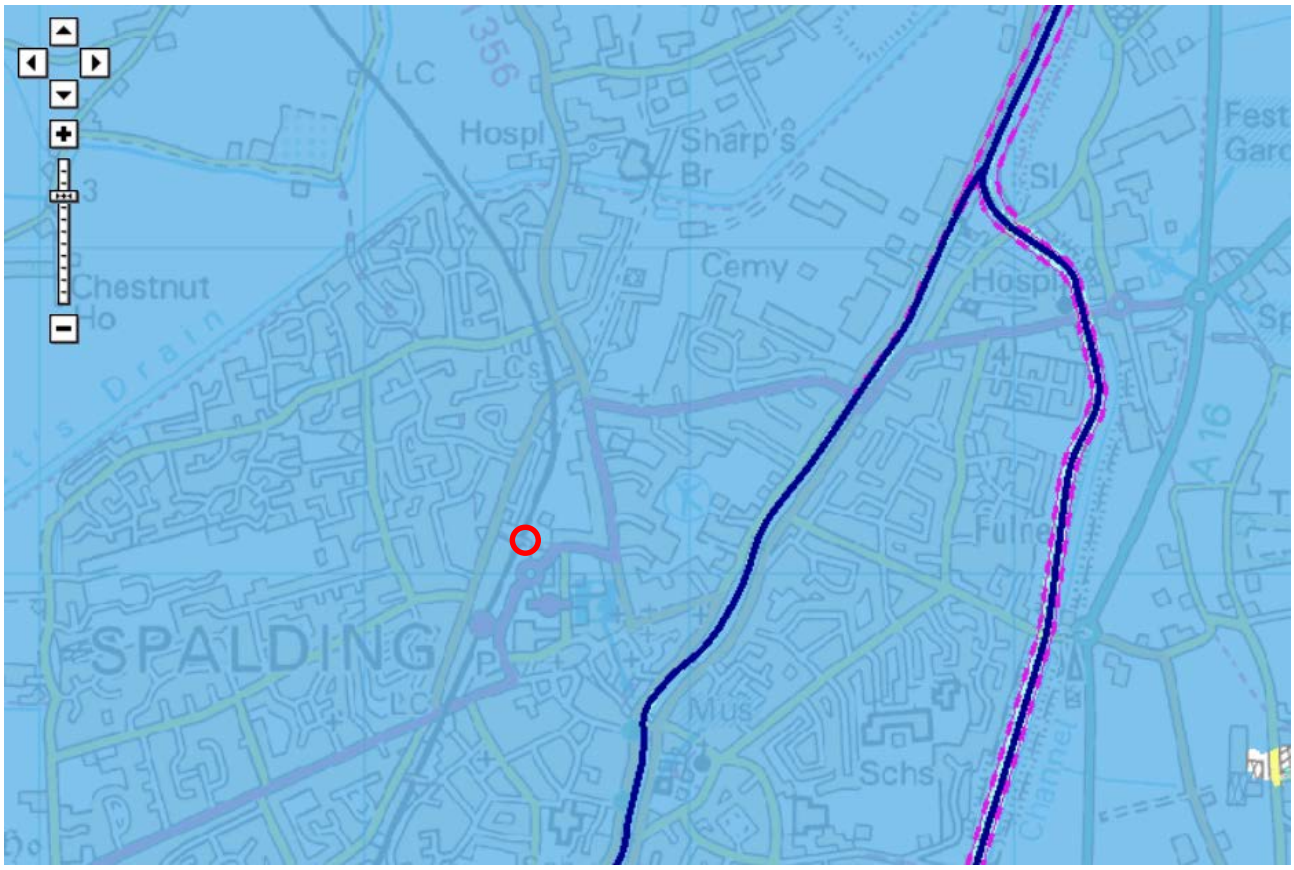


FIGURE 2 SCREEN SHOT TAKEN FROM THE ENVIRONMENT AGENCY'S ONLINE FLOOD MAP ON 15.09.15

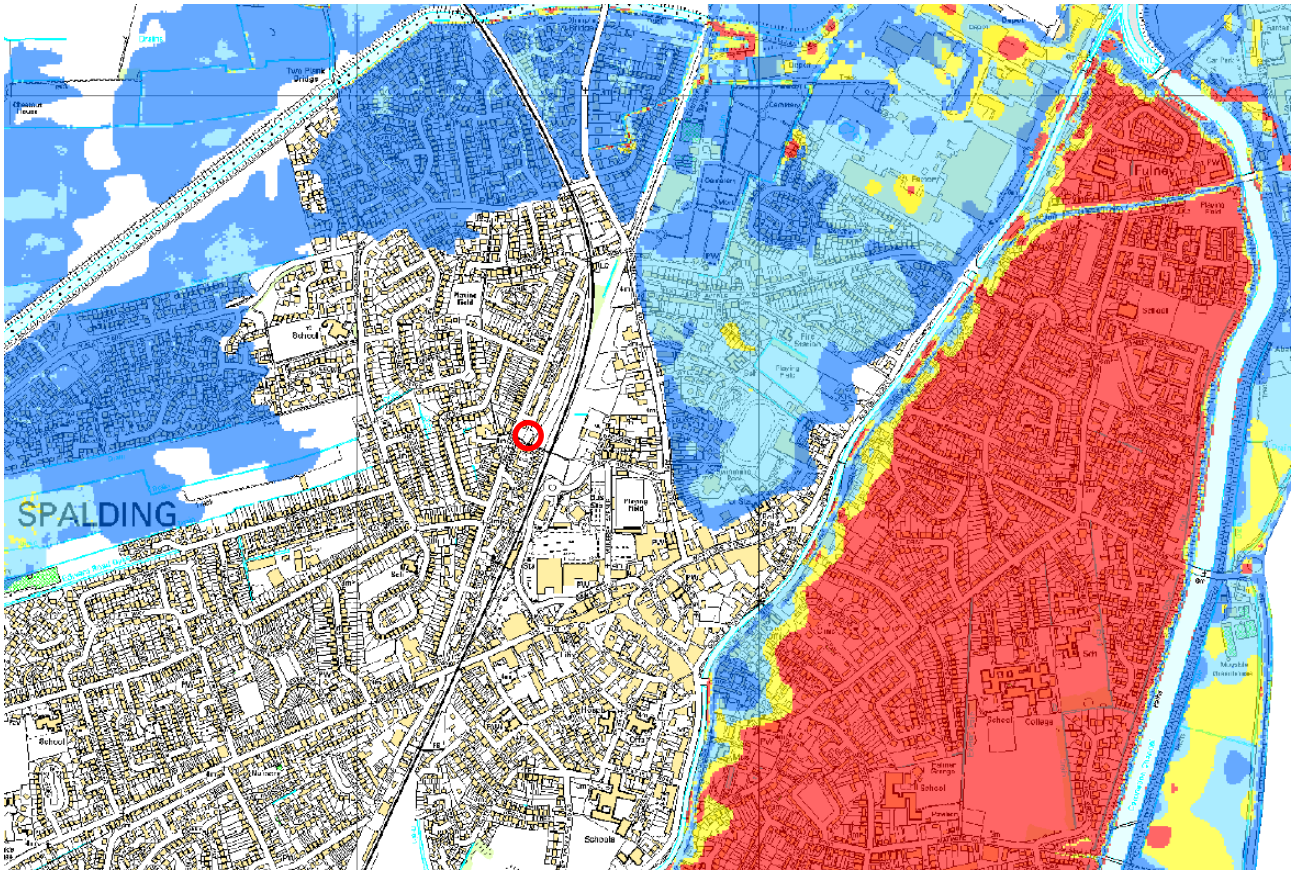


FIGURE 3 SCREEN SHOT TAKEN FROM THE RESIDUAL FLOOD MAP (1%A.P. FLUVIAL / 0.5%A.P. YEAR 2115)

4.3 Risk of Flood Defence Breach or Overtopping

The 1% a.p. fluvial / 0.5% a.p. coastal plus climate change and 0.1% a.p. residual flood maps, which includes overtopping and breach, show no flooding at the proposed development site (Appendix D).

4.4 Surface Water Flooding

The Environment Agency surface water flood mapping generally indicates that the site is at 'very low' chance of flooding from this source (a chance of flooding of less than 1 in 1000 (0.1%). There is a small amount of flooding shown along Parkside Crescent.

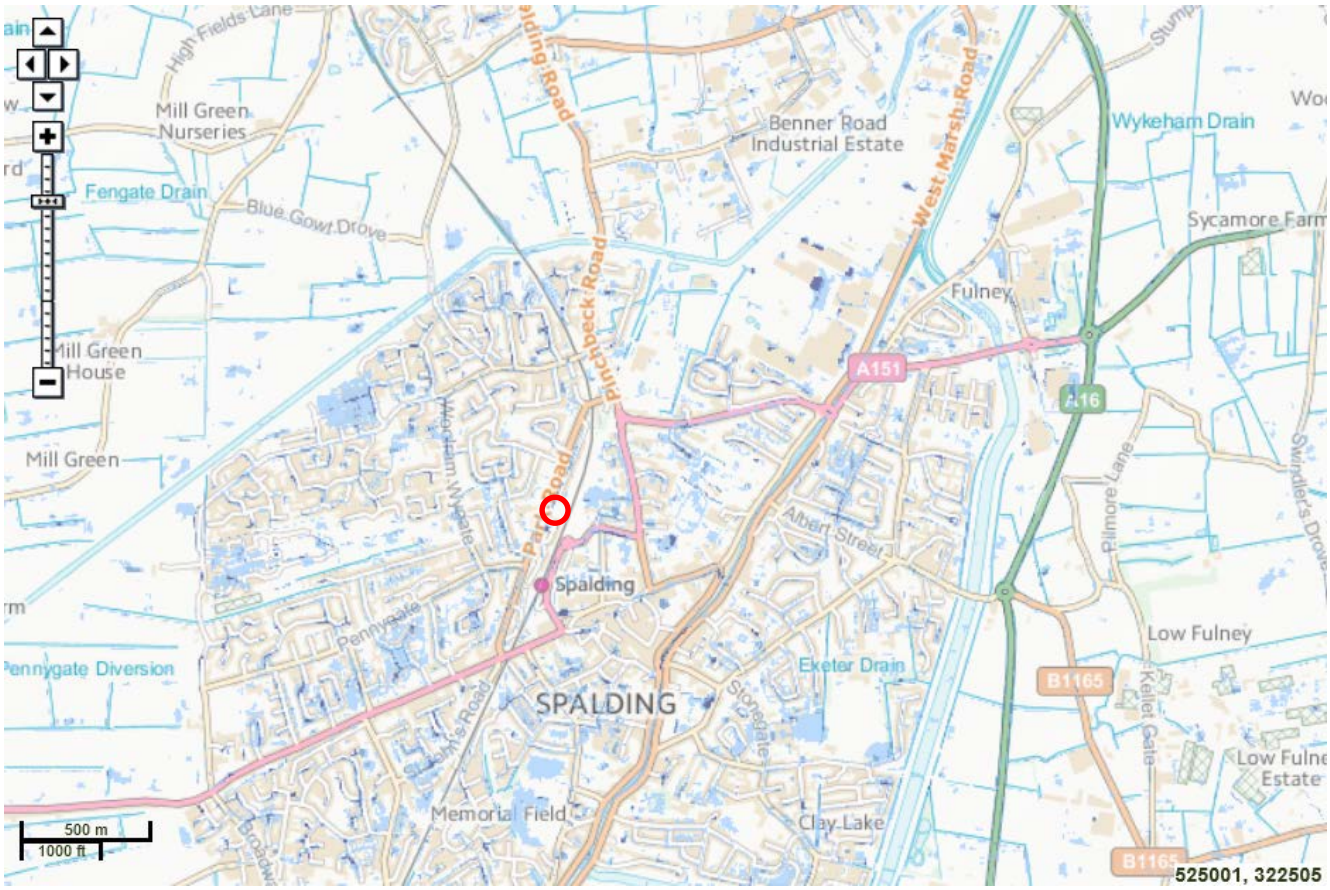


FIGURE 4 - SCREEN SHOT TAKEN FROM THE ENVIRONMENT AGENCY SURFACE WATER FLOOD MAP ON 03.09.2015

4.5 Groundwater Flooding

South Holland District Council published an updated Strategic Flood Risk Assessment in January 2010. The report says:

> *'There are no reports of groundwater flooding occurring in the District. This issue is therefore taken as having no strategic significance in relation to flood risk.'*

The site owner has no knowledge of groundwater flooding affecting the site.

Groundwater flooding is therefore not considered a significant risk to the site.

4.6 Sewer Flooding

South Holland District Council's updated Strategic Flood Risk Assessment reports:

> *'Through consultation with Anglian Water, as well as drawing on the Council's own local experience, it is found that flooding from sewers is limited to minor isolated cases. It is not of strategic significance as regards flood risk.'*

The site owner has no knowledge of sewer flooding affecting the site.

Sewer flooding is therefore not considered a significant risk to the site.

Anglian Water report that a rising main crosses the site.

4.7 Flooding from Reservoirs, Canals and Other Artificial Sources

The development site is not shown as being at risk of reservoir flooding on the Environment Agency's reservoir flood map.

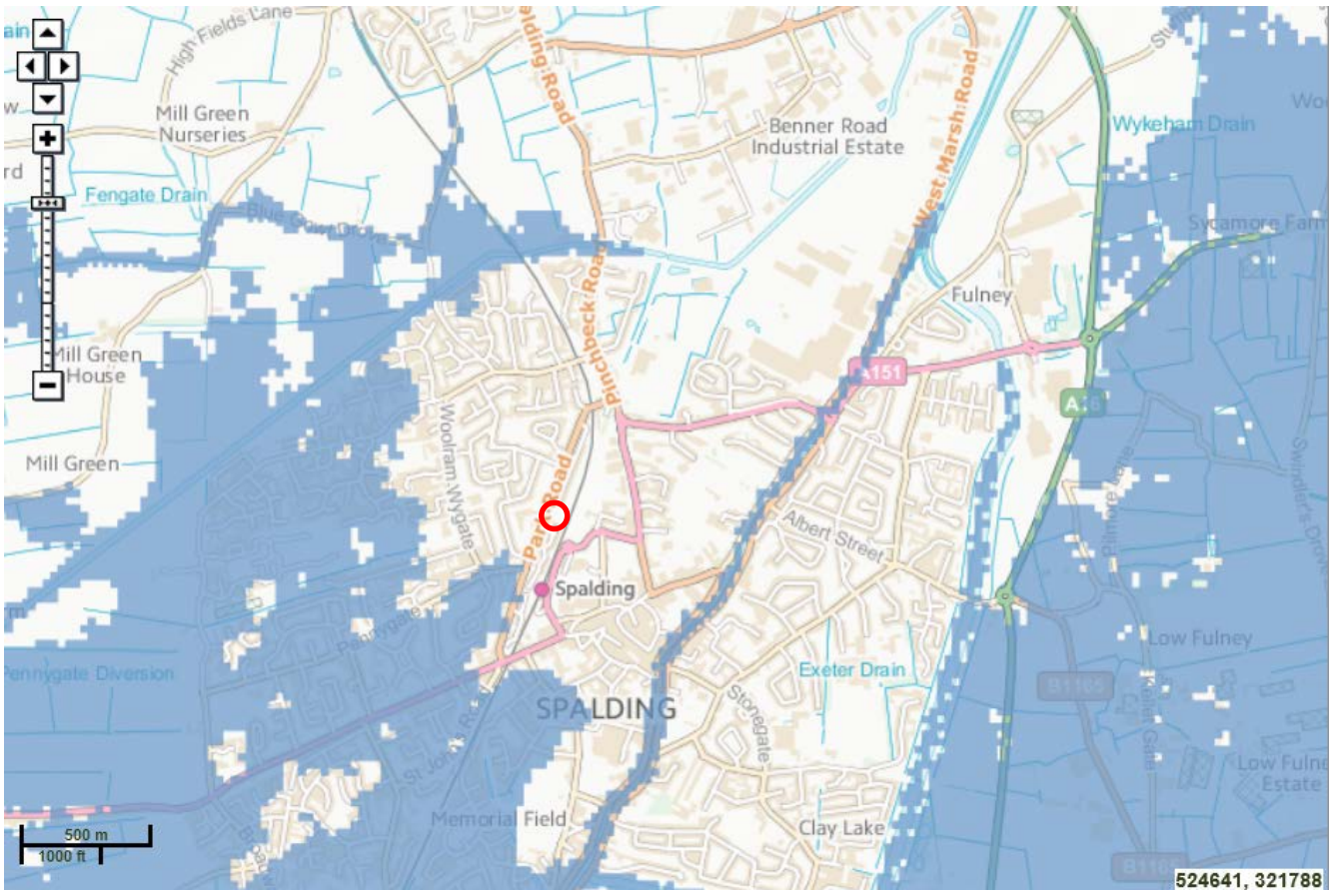


FIGURE 5 - SCREEN SHOT TAKEN FROM THE ENVIRONMENT AGENCY RESERVOIR FLOOD MAP ON 15.09.2015

The site is not in close proximity to a raised canal.

4.8 Previous Flood History

South Holland District Council's updated Strategic Flood Risk Assessment reports no flood events since construction of the Coronation Channel through Spalding in 1953, which diverts excess water around Spalding. Prior to construction, parts of the town were prone to flooding. Post-construction and with the coastal flood defence scheme in place, it is understood that the town and development site have not been flooded. The system was severely tested by a tidal event in January 1978, where the flood level was near to the 0.5% (1 in 200) annual probability level and was accompanied by strong winds and wave action.

The site owner has no knowledge of flooding occurring at the site over the past years, which includes the storm of 2013.

5.0 Mitigation measures

5.1 Recommended Finished Floor Levels

The Environment Agency advise that, for Parkside Crescent, finished floor levels should be set 150mm above ground level.

The existing ground levels are shown on the topographic survey in Appendix E.

5.2 Safe Access and Exit

The development site and access receive a high level of flood protection. A safe dry access route will therefore be available in all but the most extreme of events.

The residual risk will be managed by the implementation of a flood warning and evacuation plan (Appendix F).

6.0 Surface Water Runoff

The total site area is approximately 3125m^2 of which approximately 20% is currently impermeable. Under the proposal the development area will increase to approximately 38%, therefore there is a potential for increased runoff leaving the site.

6.1 SUDS – Sustainable Drainage Systems

Paragraph 1.3.2 from the SUDS manual (C697) discusses the SUDS 'management train' which is intended to mimic the natural catchment process as closely as possible. The hierarchy of techniques used to achieve the management train include:

Table 1 Hierarchy of techniques and their descriptions

Technique	Description
Prevention	The use of good house design and housekeeping measures to prevent runoff and pollution; rainwater reuse/harvesting
Source control	Soakaways, porous and pervious surfaces, water butts, green roofs
Site control	Routing water to large soakaways, infiltration or detention basins
Regional control	Balancing pond, wetlands, swales, retention ponds

Table 2 Feasibility of SuDS techniques at the proposed site

Technique	Issues	Feasible? Y / N
Prevention		
Good building design and rainwater harvesting	Ensuring that drains and guttering are properly located and laid could enable water to be collected for re-use via water butts or water harvesting systems.	Y
Source Control		
Porous and pervious materials/Soakaways/Green Roof	Permeable surfaces could be applied to the driveways and hardstanding areas to enable water to infiltrate as existing, The ground investigation company, ST Consult, report (Appendix G) that relevant borehole data shows summer groundwater between 1.5 and 2.2m below ground. Concentrated infiltration units, such as soakaways, are not expected to be appropriate given the high groundwater. The use of green roofs would provide both attenuation and natural water losses.	Y N Y
Site and Regional Control		
Infiltration / detention basins / balancing ponds / wetlands / swales / retention ponds	Shallow infiltration techniques may be appropriate. The shallow infiltration units, or underground systems, would provide attenuation storage space.	Y Y

Existing drainage

- 0.313ha total site area.
- 0.010ha of building footprint (garages).
- 0.053ha of impermeable surface.
- 0.250ha of permeable ground.

The existing garages are not formally drained. Rainwater simply falls, via downpipes, onto permeable ground behind the buildings. The hardstanding area contains one gulley located at a central low spot.

Anglian water report that there are no sewers serving this part of Spalding, however Welland Deepings Internal Drainage Board (IDB) confirm that they maintain an underground piped drain that crosses the site (Park Road Dyke). It is expected that impermeable areas in the local area discharge into this drain.

Proposed drainage

The total proposed area of buildings will be 0.040ha, while the total proposed area of road/parking will be 0.075ha. This gives a total drained area of 0.115ha.

ST Consult report the ground comprising sand/silt down to a depth of 4m (Appendix G), with summer groundwater between 1.5 and 2.2m below ground level. The relatively high groundwater will constrain the use of infiltration as the sole method of discharging surface water. Shallow infiltration components are expected to be effective.

The IDB drain will provide a final discharge point for the development, although a formal agreement would be needed to connect. During informal discussions with the IDB, it was suggested that a restriction would need to be applied to any discharge of greenfield runoff rate, 1.4l/s/ha. This flow equates to 0.16l/s. A minimum controlled outflow rate of 5l/s is normally advised to mitigate the risk of blockage within the drainage system.

The quick storage estimator module of Microdrainage has been used to estimate the total required attenuation storage volume and demonstrate feasibility of the concept. The required attenuation storage volume for 1 in 100 year annual probability plus climate change storms has been estimated to be in the range 30 – 60m^3 [1].

This volume could easily be held above ground on the green spaces within the development to the west and east. The storage could be in the form of swales or shallow basins. The west square of green space is approximately 580m^2. The east strip of green space is approximately 250m^2. These storage areas would therefore need to manage approximately 0.15m depth of water during a 1 in 100 year annual probability plus climate change storm, assuming 50% of the space is available.

Alternatively, the road / parking areas could be used to store water, below ground. The area of this part of the development is 630m^2. This storage area would therefore need to manage approximately 0.32m depth of water during a 1 in 100 year annual probability plus climate change storm, assuming 30% of the space within the sub-base is available.

It is possible that during a major storm the Park Road Dyke will be full, imposing a natural limit on runoff from the site. Assuming runoff is actually limited to 0.16l/s with no infiltration available, as a worst case, the storage volume is estimated to increase to 104 – 128m^3. The additional 68m^3 of flood water could be managed within a larger swale, basin or porous car park sub-base. Alternatively this could be safely managed above ground contained by road kerbs and landscaping.

It is recommended that SuDS ‘prevention’ methods are used, either water harvesting or green / blue rooftops, to reduce and attenuate rainfall discharging from the houses.

Attention must be paid to exceedance of design. It is recommended that kerbs are used on the access road to safely contain rainwater from the whole scheme in the event of drainage scheme

[1] FEH Rainfall; C1(1km)=-0.023; D1(1km)=0.300; D2(1km)=0.303; D3(1km)=0.229; E(1km)=0.314; F(1km)=2.490; Cv=0.750(winter); Cv=0.840(summer); Impermeable area=0.115ha; Allowable discharge=5.0l/s; Infiltration coefficient=0.1m/hr; Safety Factor=2.0; Climate change=30%.

failure or exceedance. Safe over flow routes should be provided, such as north onto Parkside Crescent, or west onto Park Road or east onto the green space that runs alongside the railway line (although the latter may be difficult given the ground topography).

Lincolnshire County Council should be contacted regarding adoption of the SuDS drainage scheme. Alternatively a private maintenance company should be engaged to manage the scheme.

7.0 Conclusion

An assessment of flood risk has been made for a planning proposal to construct 10 dwellings on land at Parkside Crescent, Spalding.

The site is within Flood Zone 3 on the Environment Agency flood map due to a combination of fluvial and coastal flooding, however the site is protected by flood defences.

Residual flooding arising from both breach and overtopping of defences is not expected to reach the site.

Residual risk to the building will be managed by setting a suitable floor level.

The flood protection scheme will ensure safe access is available. In the unlikely event of an extreme flood the residual risk to people will be managed through the implementation of a flood warning and evacuation plan.

The development will manage all runoff through a combination of shallow infiltration and attenuation storage to ensure no increase of rates and volumes leaving the site.

It is concluded that the proposed development is appropriate for the flood risk and is not expected to increase the risk of flooding elsewhere.

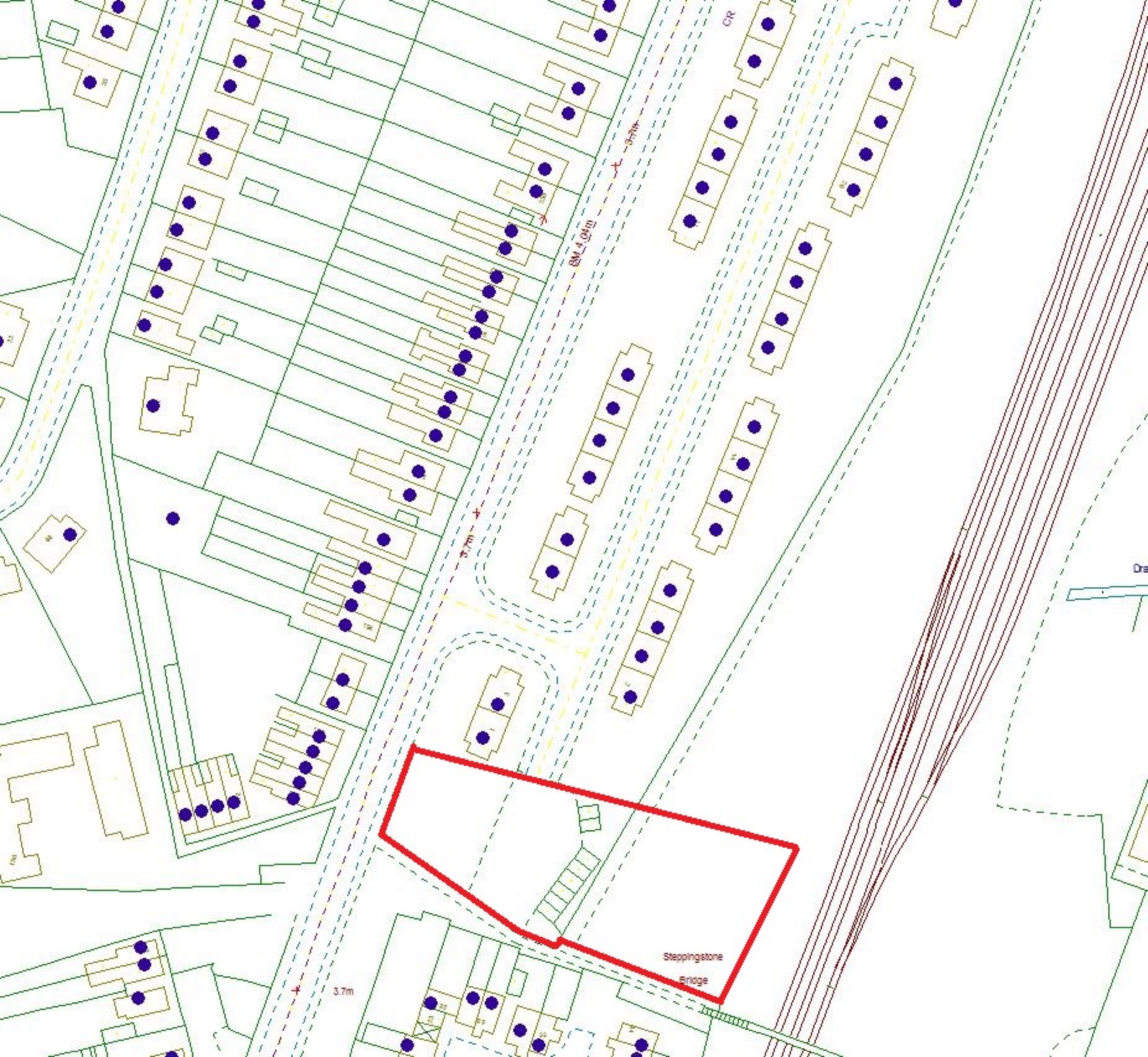
8.0 Recommendations

- Set finished floor levels 150mm above the ground.
- Residents should sign up for the Environment Agency flood warning service and implement the flood warning and evacuation plan given in Appendix F.
- Undertake ground testing to establish infiltration rate and ground stability.
- Produce a detailed drainage design in line with the strategy given in Section 6.0.
- Trace the route of the IDB drain and Anglian Water sewer as they cross the site. Consult with the organisations to ensure the necessary easements are met and connection agreements put in place.

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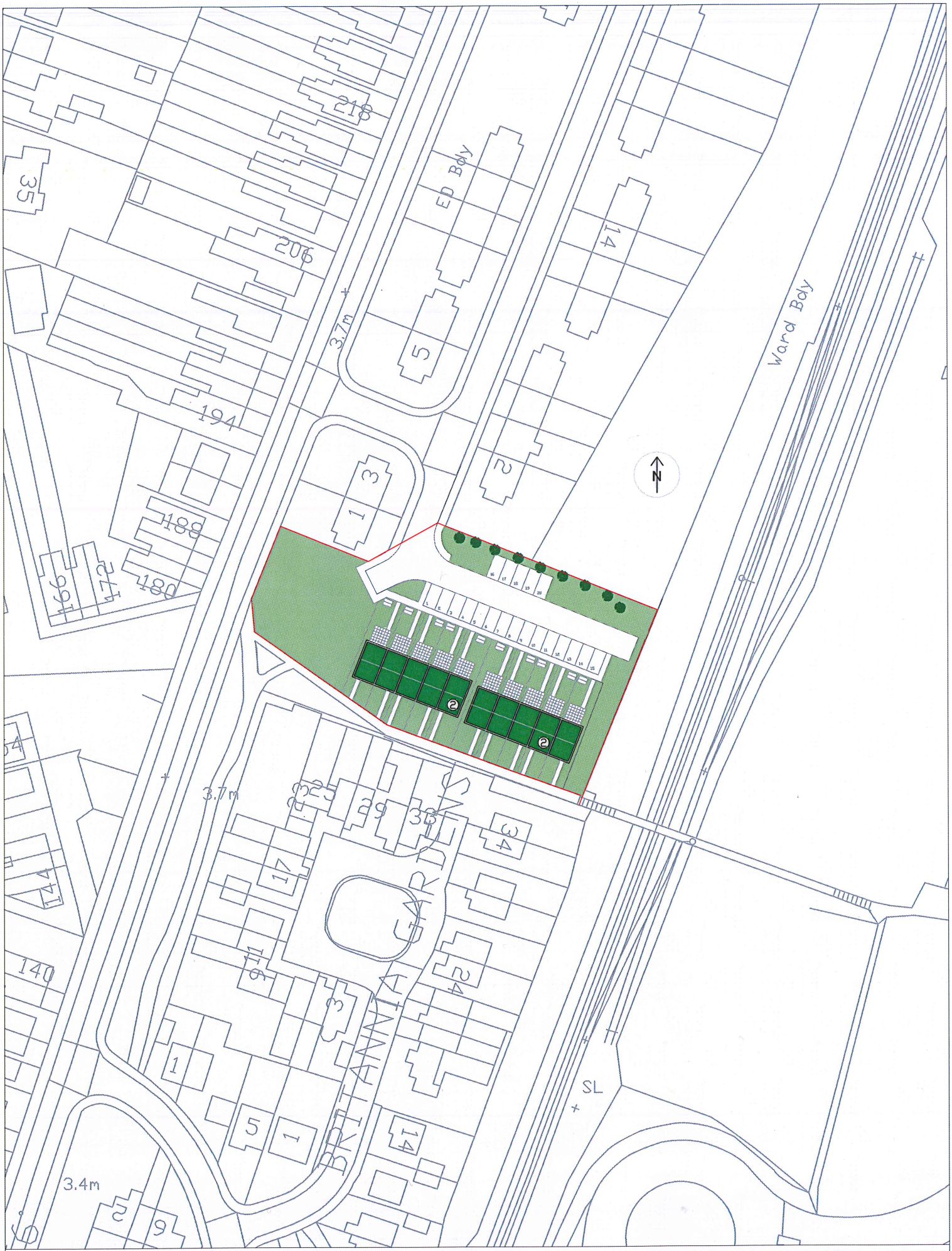
Appendix A – Site location plan

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BM 4.04m
3.7m
Steppingstone
Bridge

Appendix B – Proposed drawings

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SOUTH HOLLAND DISTRICT COUNCIL	Property Services South Holland District Council Council Offices Priory Road Spalding Lincs. PE11 2XE Tel: (01775) 761161 Fax: (01775) 761048	PROJECT PROPOSED NEW BUILD SCHEME PARKSIDE CRESCENT, SPALDING 10 X 2 BED TERRACE HOUSING	DATE: 20/ 01 / 2016 SCALE: 1:1000 DRAWN: R. HASTIE DRAWING No.: 04b

Appendix C – Sequential Test

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Sequential Test & Exception Test – Parkside Crescent, Spalding

1.0 Proposed Development

The proposed development site is located at Parkside Crescent, Spalding, Lincolnshire PE11 1RA; NGR: TF 24427 23147.

The existing site comprises 8 garages with hardstanding and surrounding lawn and natural areas. The total site area is approximately 3125m^2 of which approximately 100m^2 is occupied by garages, 525m^2 is hardstanding and the remaining 2500m^2 is permeable.

Planning permission is being sought to construct 10 dwellings, configured as 2 blocks of 5 terraced houses. The development will also include an access road, 20 parking spaces, paths, patios and gardens. The total building footprint will be approximately 395m^2. The area of access road and parking spaces will be approximately 480m^2 and 265m^2 respectively. With sustainable choices for the access road and parking the proposal has the potential to reduce the drained impermeable area at the site.



FIGURE 1 – GOOGLE MAPS STREET VIEW IMAGE SHOWING THE EXISTING SITE

2.0 Flood Risk

The site lies within Flood Zone 3 (Land having a 1 in 100 or greater annual probability of river flooding) according to the Environment Agency's indicative flood map for planning.

The proposed development is classed as a 'more vulnerable' development in accordance with Table 2 Flood Risk Vulnerability Classification of the National Planning Policy Framework (NPPF) Planning Practice Guidance. A sequential test and exception test is therefore required in accordance with Table 3 Flood Risk Vulnerability and Flood Zone 'Compatibility' of the NPPF Planning Practice Guidance.

3.0 Sequential Test

The proposed development is a windfall opportunity to provide 10 high quality terraced houses on a brownfield site, centrally located within Spalding with ample car parking.

The proposed site is located within walking distance of local services and amenities and there is good access directly from Parkside Crescent.

Possible alternative sites have been limited to Spalding. Alternatives have been screened from the South East Lincolnshire SHLAA annual review 2010 (the most up to date document available on the South East Lincolnshire Joint Strategic Planning Committee's website), online estate agencies and Google maps. Any sites with area greater than 0.3ha have been automatically rejected, as being too large for a 10 dwelling development.

Flood risk at the alternative sites has been assessed using the Environment Agency's flood map for planning.

1. SH/SPA/08 – Steppingstones Bridge, which is in Flood Zone 3. This alternative is not lower flood risk compared with the proposed site as is therefore not sequentially preferable.
2. SH/SPA/10 – Horseshoe Road, which is in Flood Zone 3. This alternative is not lower flood risk compared with the proposed site as is therefore not sequentially preferable.
3. SH/SPA/37 – Churchill Drive, which is in Flood Zone 3. This alternative is not lower flood risk compared with the proposed site as is therefore not sequentially preferable.
4. SH/SPA/38 – Holbeach Road, which is in Flood Zone 3. This alternative is not lower flood risk compared with the proposed site as is therefore not sequentially preferable.
5. SH/SPA/39 – London Road, which is in Flood Zone 3. This alternative is not lower flood risk compared with the proposed site as is therefore not sequentially preferable.

The whole of the Spalding Parish is essentially within Flood Zone 3 and as such no sequentially preferable sites at lower flood risk are available.

4.0 Exception Test

The development must fulfil two conditions to pass the Exception Test:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared;
- A site-specific Flood Risk Assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere and where possible, will reduce flood risk overall.

South East Lincolnshire Joint Strategic Planning Committee published a Sustainability Appraisal Scoping Report in July 2012. The report does not develop specific Sustainability Objectives, but is structured around a series of topic areas. The report does however identify the relevance of the earlier Lincolnshire Coastal Study to South East Lincolnshire and this earlier report does identify 15 specific objectives.

Benefits arising from the proposed development at Parkside Crescent have been identified against the Lincolnshire Coastal Study Sustainability Appraisal objectives in the table below:

Sustainability Objectives	Benefit in line with the objective
1. To ensure that the existing and future housing stock meets the housing needs of all communities.	The development will provide additional accommodation centrally located within Spalding, where the need is high but new development options are constrained.
2. To improve health and reduce health inequalities by promoting healthy lifestyles, protecting health and providing health services.	The proposed houses will be centrally located, within walking/cycling distance of employers, shops and services, encouraging residents' healthy lifestyle. The development will match the location of people with services, minimising the impact of travel on the environment.
3. To improve accessibility to jobs and services by increasing the use of public transport, cycling and walking, and reducing traffic growth and congestion.	The proposed houses will be centrally located, within walking/cycling distance of employers, shops and services, encouraging residents' healthy lifestyle. The development will match the location of people with services, minimising the impact of travel on the environment.
4. To reduce social exclusion and improve equality of opportunity amongst social groups.	The proposed houses are to be rented and have been designed to make it financially viable for a wide range of prospective tenants.
5. To improve educational achievement and skills levels.	The proposed houses will be centrally located, within easy distance of a range of educational services.
6. To protect, enhance and sustain biodiversity and to conserve geodiversity.	The development will protect biodiversity through careful garden design.
7. To restore and manage the historic environment and built environment.	The proposed site currently houses functional garages and hardstanding. The proposal will introduce good quality housing designed to be in-keeping with the local street scene.
8. To manage landscape change and enhance landscape quality.	The proposed site currently houses functional garages and hardstanding. The proposal will introduce good quality housing designed to be in-keeping with the local street scene.
9. To encourage sustainable use of resources, specifically land and water.	The development is proposed for a brownfield site. The development will provide an opportunity to improve drained water quantity and quality from the site in line with the latest SuDS best practice.

	The development will make use of the latest building best practice, to improve energy and water usage. The development can utilise existing service infrastructure at the site.
10. To reduce risk of fluvial and coastal flooding by adapting to climate change and coastal erosion.	The planning proposal provides an opportunity for a Flood Risk Assessment to ensure that the development is safe from flooding now and for the future, taking account of climate change. The development will provide an opportunity to improve drained water quantity and quality from the site in line with the latest SuDS best practice. The development will make use of the latest building best practice, to improve energy and water usage.
11. To reduce levels of atmospheric greenhouse gases (GHG) by reducing emissions and increasing extent of carbon sinks.	The development will make use of the latest building best practice, to improve energy and water usage. The proposed houses will be centrally located, within walking/cycling distance of employers, shops and services, reducing the number of car journeys.
12. To promote the utilisation of the local renewable energy potential.	The development gives an opportunity for the incorporation of solar cells.
13. To maximise the area's economic comparative advantages.	The type of residences proposed are expected to appeal to a wide range of tenants, helping to retain and encourage new skilled employees into the area.

A site-specific Flood Risk Assessment has been drafted, which demonstrates that the development is safe and will not increase the flood risk elsewhere.

5.0 Conclusion

There are no sequentially preferable sites available in lower flood risk areas that meet the aim of the project.

The proposed development provides wider sustainability benefits for the community that outweigh flood risk.

A Flood Risk Assessment has been drafted that demonstrates the development is safe and will not increase the flood risk elsewhere.

The proposal passes the requirement of the sequential test and fulfils the two conditions of the exception test and therefore is in accordance with the criteria for determining planning applications as detailed in paragraph 102 of the National Planning Policy Framework.

Appendix D – Environment Agency information

Gavin Wilson

From: Lincs & Northants, Customer Enquiries <LNenquiries@environment-agency.gov.uk>
Sent: 16 July 2015 16:36
To: Hannah Mays
Subject: RE: Product 4 data request - Parkside Crescent, Spalding-CCN/2015/39609

Hello Hannah,

Following your discussion with Rachel, please see our comments below:

The products provide in channel levels which will be high due to the flood defences.

The FRA should assess the flood risk mitigation required from the hazard mapping included in the South Holland Strategic Flood Risk Assessment SFRA http://www.sholland.gov.uk/environment/plandev/localplan/background/lfraupdatefinal2010.htm . The residual depth maps including climate change (2115 maps) should be used. This map shows no flooding on this site.

FRA requirements for Parkside Crescent

- Finished floor levels should be set 150mm above ground level.

If you would like to discuss this further, please contact Rachael Storey, Partnership & Strategic Overview Officer by calling 01536 385225 or email rachael.storey@environment-agency.gov.uk

Many thanks.

Regards
Bola Abioye
Customers & Engagement Officer (Interim)

Environment Agency
Lincolnshire and Northamptonshire Area
✉ Waterside House, Waterside North, Lincoln, LN2 5HA
abimbola.abioye@environment-agency.gov.uk
www.gov.uk/environment-agency

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Appendix E – Topographic survey

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North.
(Indicative)

524400E
524425E
524450E
524475E
323175N
323150N
323125N
323100N

5250-1
524396.465
323150.234
3.598

5250-2
524433.078
323169.453
3.521

5250-3
524426.700
323159.722
3.830

5250-4
524443.052
323125.077
3.871

5250-5
524445.544
323104.544
3.967

SCALE BAR
0m 20m 40m 60m

DRAWING KEY

STANDARD BOUNDARIES

	FENCE
BF	BOARDED
CLF	CHAIN LINK
CF	CHESTNUT
BWF	BARBED WIRE
EF	ELECTRIC
PRF	POST & RAIL
PWF	POST & WIRE
GP	GATEPOST
PF	PANEL
IR	IRON RAILING
	GATE
PT	POST

SURFACES

	ROAD EDGE (NON KERBED)
	FOOTPATH
DK	DROP KERB
KO	KERB OUTLET
TK	TRACK
7.621	KERB

FEATURES

BW	BRICK WALL
BG	BUILDING
SW	STONE WALL
CW	CONCRETE WALL
BLW	BLOCK WALL
RW	RETAINING WALL
	SHED
	STRUCTURE
+ 5.55	GROUND LEVEL IS 5.55M
BM	BENCHMARK
STN	SURVEY STATION
G 0.5	TREE GIRTH CIRCUM 0.5M
S 6	SPREAD RADIUS 6M
H 10	HEIGHT 10M
ASH	SPECIES ASH
STUMP	STUMP GIRTH TO SCALE

	HEDGE
	FOLIAGE OUTLINE
	BANKING

STREET SERVICES

LP	LAMPPOST
	NAME SIGN/PLATE
MS	MILE STONE
TS	TRAFFIC SIGNAL
RS	ROAD SIGN
BCN	BELISHA BEACON
BD	BOLLARD
HR	HAND RAIL
CB	CRASH BARRIER
BENCH	BENCH
BS	BUS STOP
CB	BT CALL BOX
BTBX	BT ABOVE GROUND BOX
BTMH	BT MANHOLE
TP	BT TELEGRAPH POLE
CATV	CABLE TELEVISION
EP	ELECTRICITY POLE
ELMH	ELECTRICITY MANHOLE
ER	EARTH ROD
GAS	GAS
FH	FIRE HYDRANT
FHMP	FIRE HYDRANT M/POST
WM	WATER METER
WSV	WATER STOP VALVE
SV	STOP VALVE
SVMP	STOP VALVE M/POST
MTR	METER
US	UNIDENTIFIED SERVICE
TSCB	TRAFFIC SIGNAL CNTL BOX
MHS	MANHOLES
MHT	
MHC	
CP	CATCH PIT
DP	DOWNPIPE
VP	VENT PIPE
RE	RODDING EYE
CL	COVER LEVEL
SL	SOFFIT LEVEL
IL	INVERT LEVEL
G 7.564	GULLY

The depiction of a wall, fence or hedge does not necessarily represent a legal boundary. It is the clients responsibility to confirm legal boundaries with the vendor
All trees measured on site have a general spread value attached. Heights of trees are approximate only.

Unless previously agreed, all services existing on site have been surveyed apart from where access is restricted by vehicles or other significant obstructions.
If applicable, manhole covers will be lifted unless this significantly obstructs the flow of traffic or vehicular access.
Manhole covers will not be lifted if this were to present any health & safety risk to staff or the public. Irreplaceable or cracked covers will also not be lifted.
All pipe directions are indicative only and have not been proved unless indicated.
For safety reasons, pipe sizes and directions are estimated from above ground and are therefore approximate.

All drawing units, levels and dimensions are in meters, unless otherwise stated.

The data used for the computation of horizontal and vertical control for this survey was recorded using our survey grade GNSS receivers.
This data was provided by Leica Geosystems Smartnet RTK correction service.
Therefore primary survey control is based on OSGB36(02)

A scale factor of 1 has been applied to this survey which has been based on station 1 and referenced to station 2.

Ratcliff
Land & Engineering Surveys Ltd
www.ratclifflandsurveys.co.uk ~ info@rlesurveys.co.uk ~ Tel: 01733 270851

JOB TITLE
TOPOGRAPHIC SURVEY OF LAND AT PARKSIDE CRESCENT, SPALDING

SHEET SIZE & SCALE	*DATE SURVEYED*	*DRAWN BY*
A2 @ 1:250	JUNE 2015	AR

DRAWING NUMBER
5250-1

CLIENT
SOUTH HOLLAND DISTRICT COUNCIL

Appendix F – Flood warning and evacuation plan

Flood Risk

Parkside Crescent is within Flood Zone 3 (Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%)) due to a combination of river and coastal flooding, however the site is protected by flood defences.

In the unlikely event of flood defence failure flood modelling shows the site will still remain dry, however some areas of Spalding and large parts of Lincolnshire will flood. There is still a residual risk of an extreme event affecting the site or access routes.

How Flood Warnings will be provided

The Environment Agency provides a free flood warning service 'Floodline Warnings Direct' for this area of Spalding, which offers a minimum 2 hour flood warning lead time before the onset of flooding at the site. Residents will need to contact the Environment Agency to register to this service by calling Floodline on **0345 988 1188**.

After a receipt of a flood warning, you are recommended to call the Environment Agency Floodline 'dial and listen' service to hear further information. After dialling **0345 988 1188** you will be given the option of entering a quick dial code for the flood warning area that relates to you.

The quick dial code that relates to you is **0311414**. This will give you an automated response regarding any flood warnings that have been issued for this area. If you wish to speak to someone about flooding in relation to Parkside Crescent you need to state that it is **Western areas of Spalding on the left bank of the River Welland and areas around Pinchbeck, including Crossgate, Pode Hole and Little London.**

Residents will be able to choose how they are contacted by the Environment Agency in the event of a flood, such as an automated telephone call, SMS text, email, fax or pager.

The Environment Agency use flood warning codes, each with specific public information / advice relating to it:



FLOOD ALERT

What it means: Flooding is possible. Be prepared.

When it's used: Two hours to two days in advance of flooding.

What to do for Parkside Crescent.

The water level is rising but the risk of flooding on Parkside Crescent is considered to be very low.

What you should do:

- Be prepared to act on your flood plan.
- Monitor local news and weather forecasts.
- Be aware of water levels. You can now see river levels on the Environment Agency's website. This information will show you what's happening to water levels in your area - http://www.environment-agency.gov.uk/homeandleisure/floods/riverlevels/default.aspx
- Call Floodline on 0345 988 1188.
- Prepare a flood kit of essential items.



FLOOD WARNING

What it means: Flooding is expected. Immediate action required.

When it's used: Half an hour to one day in advance of flooding.

What to do for Parkside Crescent.

You should take action when a flood warning is issued and not wait for a severe flood warning.

The water level is still rising, and flooding is expected. You should implement your flood warning and evacuation plan now.

What you should do:

- Evacuate the site if advised to do so by the emergency services and it is safe to do so.
- If the site is flooded and evacuation is not possible, people should stay in a high place with means of an escape.
- Call Floodline on 0345 988 1188 and monitor water levels.

- Turn off gas, electricity and water supplies if it is safe to do so. If you lose utility services, evacuate to the designated rest centre.
- Avoid walking or driving through floodwater, there could be hidden dangers, such as raised manhole covers (so have the potential to fall down a manhole).
- If in danger call 999 immediately. Listen to emergency services.



SEVERE FLOODING.
DANGER TO LIFE.

SEVERE FLOOD WARNING

What it means: Severe flooding. Danger to life.

When it's used: When flooding poses a significant risk to life.

What to do for Parkside Crescent.

Flooding is now posing a significant risk to life or disruption to the local community. Flooding at the site is expected.

What you should do:

- Act as with a Flood Warning.
- Evacuate the site if advised to do so by the emergency services and it is safe to do so.
- If the site is flooded and evacuation is not possible, people should stay in a high place with means of an escape.
- Call Floodline on 0345 988 1188 and monitor water levels.
- Turn off gas, electricity and water supplies if it is safe to do so. If you lose utility services, evacuate to the designated rest centre.
- Avoid walking or driving through floodwater, there could be hidden dangers, such as raised manhole covers (so have the potential to fall down a manhole).
- If in danger call 999 immediately. Listen to emergency services.

Emergency Flood Plan – Parkside Crescent

A list of useful telephone numbers:	**Environment Agency:**	
	Floodline	0345 988 1188
	Quick dial code	0311414
	Environment Agency – General Enquires	03708 506 506
	Emergency Services:	
	Lincolnshire Fire and Rescue	01522 582222
	Lincolnshire Police	101
	East Midlands Ambulance Service	0115 884 5000
	In an emergency, dial 999	
Useful numbers (for owners to include):	Lincolnshire County Council	01522 552222
	South Holland District Council	01775 761161
	Insurance Company	
	Neighbours	
A Flood Kit: (This should be collected and stored in a place where it can be easily accessed).	***This should include:*** Any key personal documents (Register, Insurance details, etc.); Torch (with spare batteries); Battery or wind-up radio; A mobile phone (with the useful telephone numbers already stored and a full battery); Rubber gloves; Wellington boots; Waterproof clothing; First aid kit; Blankets.	
Medication:	Do any residents need regular medication?	
Valuable belongings:	Get into the habit of storing these in a high place.	
Flood boards / sandbags:	Have a few flood boards and sandbags prepared to block doorways and airbricks.	
Gas, Electricity and Water:	Ensure that you know how to turn these off, be aware that you may need to do this in the dark.	
Motor Vehicles:	Is there anywhere that vehicle(s) could be stored (garage?) so that they do not cause any damage if they are moved by floodwaters?	
Evacuation:	If flooding is severe, you may be evacuated. Think about what you need to take with you.	
DON'T WAIT FOR A FLOOD TO SEE IF YOUR FLOOD PLAN WORKS TEST IT NOW!		

Appendix G – Ground testing information

Gavin Wilson

From: Anthony Paton <apaton@stconsult.co.uk>
Sent: 06 August 2015 09:43
To: Hannah Mays
Subject: RE: Parkside Crescent, Spalding

Hannah,

Ive just looked over the borehole logs – groundwater was encountered in every borehole at depths between 1.5-2.2m bgl and obviously we would expect this groundwater level to rise in the winter months.

The soils encountered down to a depth of 4.0m were a sand/silt, however deeper more impermeable clayey lenses cannot be ruled out due to the nature of the Tidal Flat Deposits. An archive borehole on site infers a peaty band at 4.4m within the Tidal Flat Deposits which could be impermeable or at least less permeable than the sand/silt encountered above.

I hope that information is of use to you,

Regards,

Anthony

Anthony Paton BSc(Hons) MSc FGS
Graduate Engineering Geologist
ST Consult, Twigden Barns, Brixworth Road, Creaton, Northamptonshire, NN6 8LU

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