

Land at Teversham Road, Fulbourn, Cambridgeshire

Proof of evidence in respect of flood risk

Application reference S/3290/19/RM

Appeal reference APP/W0530/W/22/3291523

Prepared by Richard Totman BEng(Hons)

April 2022

Document Review Sheet:

Reference	Date	Author	Reviewed
CCE/B411/RM-PoE-01	16 th March 2022	RT	JH
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1.0 Introduction

Qualifications and Experience

- 1.1 I am Richard Totman and I hold a Bachelor of Engineering Degree with Honours in Civil Engineering awarded by Nottingham University in 1996. I am a Graduate Member of the Institution of Civil Engineers.
- 1.2 I have 25 years' experience in Civil Engineering gained with consultants in the UK. This experience has included highway and infrastructure design but the majority of my experience relates to water engineering and management. Specifically in the areas of flood risk assessment, drainage strategy and design, and hydrological aspects of environmental impact assessments for residential developments, commercial / retail schemes, waste management facilities, minerals extraction, and renewable energy.
- 1.3 I am a co-founder and Director of Cannon Consulting Engineers where I head the Infrastructure Planning team.
- 1.4 Cannon Consulting Engineers has been trading for over 15 years with offices in Newmarket and London. Cannon Consulting Engineers provide professional advice on flood risk and drainage, highways and transportation, and utilities planning and design.

Evidence purpose

- 1.5 At the instruction of Castlefield International Ltd my evidence outlines how flooding and surface water management has been assessed and accounted for within the appeal scheme with reference to:
- Surface water flooding (run-on); and
 - Surface water management (runoff).

Evidence structure

- 1.6 My evidence is arranged as follows:
- Section 2 will describe my role and involvement with the Appeal Site and the proposed development (approved in outline).
 - Section 3 will outline the water management principles for this location.
 - Section 4 will discuss the second reason for refusal of the Reserved Matters application.
 - Section 5 will summarise the Rule 6 Party objections.
 - Section 6 will present my conclusions.

1.7 My proof of evidence deals wholly with topics that fall within my area of expertise.

Declaration

1.8 The evidence which I have prepared and provide for this appeal (reference APP/W0530/W/22/3291523) is true and has been prepared and is given in accordance with the guidance of the Institution of Civil Engineers and I confirm that the opinions expressed are my true professional opinions.

2.0 Background

Role and Involvement

- 2.1 Cannon Consulting Engineers was first instructed in July 2007 to help promote the Appeal Site through the then Local Development Framework. The advice included an initial appraisal of the flooding and drainage constraints at the Appeal Site. In 2008 an addendum report was prepared that specifically focussed on the potential risk of groundwater flooding and likely mitigation measures. A further round of site promotion then occurred in 2012 when a second addendum was produced covering the matters of flood management and surface water management.
- 2.2 Cannon Consulting Engineers continued to provide support for the 2014 outline planning application (reference S/2273/14/OL), the 2016 planning appeal (reference APP/W0530/W/15/3139730), and a second outline planning application (reference S/0202/17/OL) which was permitted in October 2017. In considering the 2017 outline application, SCDC identified flood risk as a key issue and concluded:
- 117. A number of representations draw attention to the site being 'wet' as evidenced in the photographs received. The site is liable to surface water flooding, however appropriate mitigation is being proposed to address this. "*
- 2.3 Cannon Consulting Engineers was instructed in 2019 to develop the surface water management scheme to address Condition 8 of the outline permission. Our role was later extended to include input to the Reserved Matters (RM) application (the subject of this document).
- 2.4 I oversaw all the technical work undertaken on this the project relating to flood risk and drainage.

Information Submission and Response Chronology

- 2.5 I attended two public consultation events in Fulbourn on the 28/6/14 and 28/8/14.
- 2.6 I attended a pre-application meeting with South Cambridgeshire District Council (SCDC) on 22/8/14.
- 2.7 The outline application submitted on 19/9/14 was accompanied by a Flood Risk Assessment (FRA) prepared in accordance with the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG).
- 2.8 In their planning consultation response dated 15/10/14 the Environment Agency (EA) raised no objection on flood risk grounds to the proposals and recommended planning conditions.

- 2.9 At the request of the SCDC drainage engineer (Mr. Matthews), an addendum to the FRA was prepared in order to summarise the findings of the FRA with regards to the assessment and management of surface water flooding at the site. The addendum was submitted on 3/12/14 and his response confirming no objection on flood risk grounds was issued on the same day.
- 2.10 A letter from Peter Brett Associates (PBA) to a third party dated 7/1/15 was formally submitted to SCDC by the 'Fulbourn Forum for community action' on 12/1/15. PBA considered there were grounds to object to the development proposal on the basis of a lack of information relating to flood risk. In their email accompanying the submission of the PBA letter the 'Fulbourn Forum for community action' stated their feeling that "...even with the extensive mitigation features suggested by Castlefield, the site is still inherently unsuitable for development".
- 2.11 Having reviewed PBA's letter on 22/1/15 the EA reiterated their position that they would not object to the proposals.
- 2.12 A response to the letter prepared by PBA was produced by Cannon Consulting Engineers and was submitted to SCDC on 26/1/15 (Appendix G).
- 2.13 Flooding and drainage were not grounds for refusal of the 2014 outline application. However in light of local concerns I attended the planning committee meeting on 5/8/15 to answer questions on the subject.
- 2.14 I addressed flood risk objections to the grant of outline planning permission in the 2016 planning appeal. The Inspector discusses this in paragraphs 67 to 69 of appeal decision APP/W0230/W/15/3139730.
- 2.15 Cambridgeshire County Council in their role as Lead Local Flood Authority (LLFA) responded to the RM application on 15/10/2019 and 19/12/2019 objecting and requesting information regarding the nature of the flood management areas within the site and how access will be maintained. Following liaison with the LLFA in early 2020 they issued a formal response removing their objection to the RM application on 20/3/2020.
- 2.16 Early responses from South Cambridgeshire District Council's Sustainable Drainage Engineers requested that the flood modelling be updated for the 2019 RM layout. This was undertaken and submitted in August 2020. Following liaison with the Sustainable Drainage Engineer to agree finished floor levels the team confirmed that the proposed development is acceptable in their response dated 19/11/2020.
- 2.17 On 18/1/2021 (following the deferral of the RM application) we were contacted by the LLFA (by email) with regards to the potential for an increase in flood levels to the south of the site, and concerns over shallow groundwater in the area. Following liaison with the LLFA (video conference and email) to agree an acceptable flood management solution the LLFA provided

their positive response removing their objection (which was never formally raised) on 9/9/2021 with accompanying informatives.

- 2.18 The LLFA response is reflected in the Officer's Report recommending approval which considers that sufficient information was submitted to demonstrate that water could be suitably managed in conjunction with the layout presented with the appeal scheme. The measures to manage both floodwater (coming from outside of the site) and surface water runoff (generated from development itself) are discussed in the Officer's Report. The report concludes that the measures would be secured as part of Condition 8 of the outline permission and that they would be supported by informatives a) groundwater monitoring, and b) surface water modelling, which are included in the Officer's Report.

3.0 Water Management

Outline Proposals

- 3.1 The approach to floodwater management established at the outline application stage comprises three raised development platforms on which the proposed dwellings would sit. The area between the two platforms in the eastern half of the site (between Cox's Drove and the central watercourse) was allocated as a floodwater storage area. The purpose of the storage area is to manage the surface water floodwater spilling onto, and passing through, the site so as to avoid it from being displaced off-site. Water from the storage area would continue to run into the central watercourse and then northwards under the rail line on the northern boundary. Outflow from the floodwater management area was restricted in order to avoid an increase in the rate of flow exiting the site.
- 3.2 The 2017 outline planning application was supported by a H R Wallingford flood model to investigate the impact of the proposed platforms on the floodwater. The impact of the platforms would be the potential loss of flood storage and their interruption of flow paths. These impacts were assessed by setting the platforms as "unfloodable" blocks in the model. The model showed some increase in off-site flood depths in the design event (the 1 in 100 annual probability event plus climate change) but as the increases were in the order of between 50 and 100 mm (with a maximum post development depth of 200 mm), the South Cambridgeshire District Council Sustainable Drainage Engineer (Simon Bunn) concluded that the proposals were acceptable and "unlikely to increase flood risk elsewhere" (response dated 15/2/2017).
- 3.3 It is worth noting that development platforms in the model extended beyond the footprint of the built development and included the surface water drainage basins and gardens in order to avoid underestimating the impact of the platforms (avoiding the need to increase the extents of the platforms thereby allowing for their reduction at the later planning and design stages).
- 3.4 The outline surface water drainage proposals comprised basins at the platform edges and tanks beneath roads. Because of the potential shallow groundwater in the area the formal use of infiltration was ruled out in favour of a restricted discharge to the central watercourse.

Design Progression

- 3.5 The appeal scheme is in accordance with the parameters and hence already deemed acceptable in flood risk terms through the outline permission. However, in order to support the appeal scheme the 'fine tuning' of the ground and flood model which would ordinarily be undertaken at the Discharge of Conditions and later detailed design stages has been brought forward.

- 3.6 The version of the flood model in Appendix A is the version which was submitted for consultation on 4/4/2022 (note that the report is a secured PDF and is therefore provided as a separate PDF document). The modelling, which is a continuation of the same modelling which supported the 2016 appeal, the 2017 outline planning application and the 2021 RM application, shows that reducing the extent of the south-eastern development platform avoids the predicted increase in off-site floodwater depths associated with the outline scheme (noted in paragraph 3.2).
- 3.7 The reduction in the extent of the south-eastern development platform is most notably achieved through not raising eight garden areas, i.e. these areas can continue to temporarily hold the floodwater being shed from land to the south of the site. Whilst other more “hard engineered” solutions were investigated, these were discounted on sustainability grounds. The flood modelling report at Appendix A shows the depths of floodwater to be in the order of 100 mm and 300 mm under the 1 in 100 annual probability event plus climate change.
- 3.8 As with the scheme principles agreed at the outline stage, the dwellings and access will be raised above the modelled flood levels to maintain access for the residents and achieve passive flood management. Passive flood management rather than active flood management avoids the need for any particular action to be taken by residents to protect their properties e.g.. closing flood gates, installing flood boards, deploying sand bags, etc. Creating development platforms rather than raising only floor levels for the individual buildings therefore remains the preferred approach to keeping buildings dry and residents safe.
- 3.9 With all the proposed dwellings within the appeal scheme, and access routes to them, being set above the 1 in 100 annual probability event plus climate change level, the development is presented as flood resilient and safe for its lifetime. The flood modelling shows this to be achievable without increasing flood risk elsewhere, which is in accordance with the NPPF and the PPG.
- 3.10 Surface water runoff from the impermeable surfaces will be attenuated and discharged at a restricted rate to the central watercourse which currently drains the site. Attenuation will be provided through a combination of basins, the head space in the existing pond, and below ground tanks. Permeably paved roads and driveways, and a filter drain serving the main access in the west will filter the development runoff before it enters the watercourse. All such details will be provided as part of a forthcoming application to discharge Condition 8 of the outline permission.

4.0 Reasons for Refusal

- 4.1 Reason for refusal 2 states that “insufficient information has been submitted to demonstrate that the reserved matters scheme can provide a satisfactory scheme of surface water drainage and prevent the increased risk of flooding”.
- 4.2 At the outset it should be noted that a detailed surface water drainage scheme for the site is required to be submitted and approved under Condition 8 of the outline permission. A detailed scheme has not yet been approved under Condition 8. It should also be noted that the principle of developing the site has been established through the outline planning permission.
- 4.3 The reason for refusal references three policies (CC/7, CC/8, and CC/9) from the South Cambridgeshire Local Plan September 2018 and one paragraph from the National Planning Policy Framework 2021 (Paragraph 167). The text in the refusal notice does not identify specific points of conflict between policy wording and the RM application.
- 4.4 Policy CC/7 “Water Quality” (policy wording below) requires adequate water supply systems, that water bodies are protected from contamination and that foul water is discharged to a sewer where possible.

“1. In order to protect and enhance water quality, all development proposals must demonstrate that:

a. There are adequate water supply, sewerage and land drainage systems (including water sources, water and waste water infrastructure) to serve the whole development, or an agreement with the relevant service provider to ensure the provision of the necessary infrastructure prior to the occupation of the development. Where development is being phased, each phase must demonstrate sufficient water supply and waste water conveyance, treatment and discharge capacity;

b. The quality of ground, surface or water bodies will not be harmed, and opportunities have been explored and taken for improvements to water quality, including renaturalisation of river morphology, and ecology;

c. Appropriate consideration is given to sources of pollution, and appropriate Sustainable Drainage Systems (SuDS) measures incorporated to protect water quality from polluted surface water runoff.

2. Foul drainage to a public sewer should be provided wherever possible, but where it is demonstrated that it is not feasible, alternative facilities must not pose unacceptable risk to water quality or quantity.”

4.5 The flood risk management related element of Policy CC/7 is limited to part 1a in that the argument could be made that a discharge to an inadequate surface water disposal route (a land drainage system) may be problematic. Surface water runoff from the impermeable surfaces site will be discharged at a controlled rate to the central watercourse (determined as part of the outline application). The watercourse can reasonably be considered as an adequate land drainage system to accommodate the site runoff.

4.6 Policy CC/8 “Sustainable Drainage Systems” requires the use of appropriate “sustainable surface water drainage systems” and lists the high level criteria against which a drainage scheme will be tested: compliance with contemporary guidance, creation of amenity and biodiversity, the location and type of surface water management, pollution prevention, and maintenance.

“Development proposals must incorporate appropriate sustainable surface water drainage systems (SuDS) appropriate to the nature of the site. Development proposals will be required to demonstrate that:

a. Surface water drainage schemes comply with the Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems and the Cambridgeshire Flood and Water Supplementary Planning Document or successor documents;

b. Opportunities have been taken to integrate sustainable drainage with the development, create amenity, enhance biodiversity, and contribute to a network of green (and blue) open space;

c. Surface water is managed close to its source and on the surface where it practicable to do so;

d. Maximum use has been made of low land take drainage measures, such as rain water recycling, green roofs, permeable surfaces and water butts;

e. Appropriate pollution control measures have been incorporated, including multiple component treatment trains; and

f. Arrangements have been established for the whole life management and maintenance of surface water drainage systems.”

4.7 The layout submitted with the appeal scheme does not preclude any of the above.

4.8 The current draft surface water management scheme (which will support the Discharge of Condition application addressing Condition 8 of the outline permission) accords with parts a, b, c, d, and, e by including a scheme which employs permeable surfacing and treats and holds runoff at source before discharging to the on-site watercourse at attenuated rates. The current draft (included in Appendix B for reference) is similar to the scheme which supported

the first iteration of the RM layout (the 2019 layout) which was confirmed as acceptable by the LLFA in their consultation response of 6/5/2020.

- 4.9 Rainwater harvesting measures such as water butts and more energy intensive items (such as private pumped systems in back gardens) would be determined at the later detailed design stages. Such items (if shown to be appropriate) would not reasonably require the layout to be altered (given their low land take). Green roofs are unlikely to be practicable for this scheme which focuses on pitched roofs. They would however be investigated with regards to the test of “maximum use” at the detailed design stages.
- 4.10 Part f has been discussed throughout the project and further details will be provided as required by Condition 8 of the outline permission. The proposed surface water management scheme will employ established techniques (storage basins, below ground tanks, permeable paving, channel drains for example) for which the maintenance requirements are well understood.
- 4.11 Policy CC/9 “Managing Flood Risk” addresses flood risk management with regards to site location and the means by which flood risk can be assessed and managed as part the application process.

1. In order to minimise flood risk, development will only be permitted where:

a. The sequential test and exception tests established by the National Planning Policy Framework demonstrate the development is acceptable (where required).

b. Floor levels are 300mm above the 1 in 100 year flood level plus an allowance for climate change where appropriate and where appropriate and practicable also 300mm above adjacent highway levels.

c. Suitable flood protection / mitigation measures are incorporated as appropriate to the level and nature of flood risk, which can be satisfactorily implemented to ensure safe occupation, access and egress. Management and maintenance plans will be required, including arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime;

d. There would be no increase to flood risk elsewhere, and opportunities to reduce flood risk elsewhere have been explored and taken (where appropriate), including limiting discharge of surface water (post development volume and peak rate) to natural greenfield rates or lower, and

e. The destination of the discharge obeys the following priority order:

- i. Firstly, to the ground via infiltration;*
- ii. Then, to a water body;*
- iii. Then, to a surface water sewer;*

iv. Discharge to a foul water or combined sewer is unacceptable.

2. Site specific Flood Risk Assessments (FRAs) appropriate to the scale and nature of the development and the risks involved, and which takes account of future climate change, will be required for the following:

f. Development proposals over 1ha in size;

g. Any other development proposals in flood zones 2 and 3; h. Any other development proposals in flood zone 1 where evidence, in particular the Strategic Flood Risk Assessment or Surface Water Management Plans, indicates there are records of historic flooding or other sources of flooding, and/or a need for more detailed analysis.

3. FRAs will need to meet national standards and local guidance (including recommendations of the South Cambridgeshire and Cambridge City Strategic Flood Risk Assessment (2010) and the Phase 1 and 2 Water Cycle Strategy or successor documents).

- 4.12 Part 1a is not relevant to the RM application as the principle that the site can be developed is established by the outline permission.
- 4.13 The finished floor levels which accompanied the appeal scheme were agreed with the SCDC Sustainable Drainage Engineer prior to submission. The revised proposed finished floor levels (refer to Appendix D) are set 300 mm above the adjacent 1 in 100 annual probability flood level with a 40 % allowance for climate change. It is not considered necessary to also set floor levels 300 mm above the adjacent road level as the site roads are not designed to flood or to function as overland flow routes for a notable depth of surface water runoff. The permeable paving proposed across the majority of the roads means that surface water ponding will be limited and short lived as it will be able to drain directly into the granular subsurface of the road make up where it lands (at source).
- 4.14 The proposed dwellings are set above the modelled flood level and therefore comply with Part 1c of CC/9. The flood protection measures are passive, with no features requiring public adoption. Long term maintenance of elements of the scheme (channels, pipes etc) will be secured as part of the overall management of the site landscaping.
- 4.15 The conclusion in the flood modelling report included in Appendix A is that the proposed development would not increase flood risk posed to properties outside of the site. The modelling exercise therefore addresses Part 1d of CC/9.
- 4.16 The disposal route for surface water runoff from the site is to the on-site watercourse (the Chalk Stream running northwards through the site). Infiltration drainage was ruled out for this application during the outline planning stages because of the potential for shallow groundwater. The proposed discharge destination therefore complies with Part 1e by first ruling out infiltration before moving to the next preferred option (discharge to a water body).

- 4.17 Parts 2, and 3 are not relevant to the RM application as they relate to the contents of a Flood Risk Assessment and this has already been submitted and signed off (at the outline application stage).
- 4.18 Paragraph 167 of the NPPF refers to a planning application rather than a RM application. The flood modelling included in Appendix A demonstrates that the layout presented with the appeal scheme can be delivered without increasing flood risk to properties outside of the site boundary.
- 4.19 The text below provides responses to Paragraphs 5.9 to 5.15 of the South Cambridgeshire District Council Statement of Case, March 2022.

“5.9 The Council’s case is that insufficient information has been submitted to demonstrate that the reserved matters scheme can provide a satisfactory scheme of surface water drainage and prevent the increased risk of flooding”

The Officer’s Report considered that sufficient information had been submitted. However, the additional flood modelling in Appendix A and outline surface water management strategy in Appendix B show that the layout presented with the appeal scheme can provide space for surface water runoff and floodwater from off-site sources.

“5.10 The Council acknowledges that Condition 08 of the OPP states “prior to the commencement of development, a detailed surface water drainage scheme to be submitted to and approved in writing by the Local Planning Authority

5.11 It is also noted that the Appellant submitted details pursuant to condition 08 (S/3209/19/DC) but [these] were subsequently withdrawn for consideration”

Condition 8 was approved by the LLFA in May 2020. Because of time constraints and to avoid confusion, the surface water management scheme was not however updated to take account of the layout presented with the appeal scheme and the Condition 8 submission was withdrawn.

“5.12 There is common ground between the parties that as the site lies towards the base of a Chalk Hill, it is likely to be exposed to elevated groundwater levels and as such the site is prone to surface water flooding”

This conflates two different forms of flooding. Surface water flooding results from overland flow of rainfall which is unable to enter the ground and/or local drainage network. Surface water flooding was modelled in August 2020 and was accepted by the South Cambridgeshire District Council Sustainable Drainage Engineer.

“5.13 It would therefore seem wholly reasonable for the Council to assess surface water drainage details as required by Condition 08 in order to be satisfied that approving the reserved matters scheme for a total of 110 dwelling [SIC] could be accommodated on site without increasing surface water elsewhere. Furthermore, it is essential to be satisfied that mitigation measures will not materially effect [SIC] land levels on site to the detriment of the character and appearance of the area as identified in RfR1”

The preceding paragraphs (5.9 to 5.12) do not reasonably lead to the conclusion that the layout presented with the appeal scheme would not be able to accommodate sufficient surface water management (drainage).

“5.14 It is noted that the Appellant will provide additional clarity on the requirements to raise the land. The Appellant’s SoC [para 5.11] states ‘clarifications of levels will be provided to support reason 2 below, enabling a clear judgement of any impacts from built form’.”

To avoid confusion it is worth clarifying that, as per the outline permission, parcels of land will be raised to create development platforms. Not all of “the land” will be raised as might be inferred from paragraph 5.14.

“5.15 on the evidence provided, the Council will demonstrate that the Appeal Scheme will be contrary to the Development Plan and National Planning Policy Framework insofar as the Appeal Scheme would increase surface water flooding elsewhere on site.

The layout presented with the appeal scheme would not reasonably be considered to increase surface water flooding elsewhere on site as the surface water flooding is either confined to specific water management areas or to areas which are to remain undeveloped.

5.0 Rule 6 Party

- 5.1 The Rule 6 Party Statement of Case includes a number of paragraphs (numbered 22 to 42) discussing various aspects of the water environment in and around the site and some of the planning history. For ease of reference Appendix E contains a table with responses to each of the paragraphs. Answers to the points raised in the Rule 6 status application are provided below as the more focused nature of the text allowed for a more ordered response within the main body of this proof.
- 5.2 Points 2 and 3 of Mr Kingsley's letter dated 21/2/2022 applying for Rule 6 status on behalf of Save Fulbourn's Fields and Fulbourn Forum outlines several flood related items of concern; these are outlined below.
- 5.3 Point 2 refers to "changes made to the slope" of the development platforms being related to an increase in flood risk. Surface water runoff from the impermeable areas will be conveyed to one of several surface water attenuation facilities (in accordance with national and local policy). The attenuation will be sized to manage up to and including the 1 in 100 annual probability storm, plus 40 % climate change. The relatively modest slope of the development platforms would not reasonably be considered as causing runoff to be shed rapidly enough to not be intercepted by the available surface water management techniques.
- 5.4 The side slopes of the development platforms will be set at a gradient of approximately 1 in 3 in order to allow for the land between the bottom of the bank and the site boundary to be at, or lower, than the existing levels. Rural runoff generated from these vegetated slopes would not therefore be conveyed directly towards the boundaries of the Appeal Site.
- 5.5 Point 2 also implies that climate change has not been taken into account. Both the flood modelling and the surface water modelling has, and will continue to, include the recommended 40 % allowance for climate change. This is a matter which will be overseen by the statutory consultees (the LLFA and LPA).
- 5.6 Point 2 refers to groundwater level records as being out-of-date. Groundwater levels commonly fluctuate rather than follow an upward (or downward) trend over time. The age of groundwater records does not therefore affect their validity. To place the groundwater records in context Appendix C compares groundwater levels in the Fulbourn Fen borehole (which is monitored by the EA) to the dates when the on-site groundwater levels were measured. The comparison shows that groundwater levels at Fulbourn Fen were either above, or close to, the mean level for the last ten years of records when the groundwater levels at the site were recorded.
- 5.7 Point 3 includes a reference to Part b of South Cambridgeshire Local Plan policy CC/9 which states that floor levels are "300 mm above the 1 in 100 year flood level plus an allowance for

climate change where appropriate and where appropriate and practicable also 300 mm above adjacent highway levels.”

- 5.8 To address the first of the two floor level criteria, it is relevant to note that there is no single flood level. The floor levels presented in support of the appeal scheme were agreed with the SCDC Sustainable Drainage Engineer before submission. However, the finished floor levels outlined on drawing B411-PL-SK-351 (included in Appendix D) have been increased and are related to adjacent/nearby flood levels (also shown on the drawing).
- 5.9 To address the second criteria (setting floor levels 300 mm above the adjacent highway) I do not consider it appropriate (necessary) to set floor levels 300 mm higher than road levels because the roads are not reasonably considered as a source of flooding. For context, a road can in some circumstances act as a channel for floodwater and/or surface water runoff. In such a case it may be appropriate to set floor levels higher than the more common 150 mm uplift required by Building Regulations. In this case the roads are not designed to convey surface water flows to any notable depth. The roads are also to be set above the adjacent modelled flood levels to prevent them acting as channels for surface water flood flow.

6.0 Conclusions

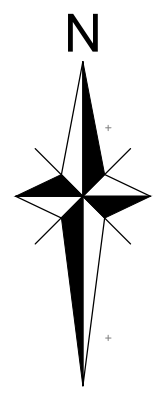
- 6.1 The results of the flood modelling in Appendix A demonstrate that the layout presented with the appeal scheme is able to be delivered whilst maintaining space for water within the site to avoid increasing flooding of off, and on-site properties.
- 6.2 The surface water management scheme for the site be provided as part of a separate application to discharge Condition 8.

Appendices

- A H R Wallingford Flood Modelling report FWM9010-RT001-R03-00
- B Drawing B411-PL-SK-350 Surface Water Management Strategy
- C Environment Agency Groundwater Level Data
- D Drawing B411-PL-SK-351 Flood Levels Plan
- E Commentary on Rule 6 Statement of Case

A H R Wallingford Flood Modelling report FWM9010-RT001-R03-00
Note that this document is a secured PDF and is therefore provided as
a separate PDF.

B Drawing B411-PL-SK-350 Surface Water Management Strategy



KEY

- 5 x 0.15m HIGH SUB-BASE REPLACEMENT CRATES. PERMAVOID OR SIMILAR APPROVED
- 4 x 0.15m HIGH SUB-BASE REPLACEMENT CRATES. PERMAVOID OR SIMILAR APPROVED
- SW NETWORK (SECTIONS OF CONNECTING PIPEWORK)
- ORIFICE CONTROL CHAMBER
- ROADSIDE FILTER DRAIN
- RILL/CHANNEL DRAIN TAKING FLOW TO AND FROM THE PUMPING HOUSE POND

NOTES

P01 NOTES REMOVED

REV	DESCRIPTION	DE	DR	CH	DATE
-	-	-	-	-	-
DESIGNED BY		DRAWN BY		CHECKED BY	
-		DP		-	
SCALE @ A1 SIZE				DATE	
D.N.S.				31/03/2022	

PROJECT TITLE
LAND AT TEVERSHAM ROAD, FULBOURN, CAMBRIDGESHIRE

DRAWING TITLE
SURFACE WATER MANAGEMENT STRATEGY

CLIENT
CASTLEFIELD INTERNATIONAL LTD

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 CONSULTING ENGINEERS
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DRAWING NUMBER	REV.
B411 - PL - SK - 350	P01

M:\B411 Fulbourn_CAMBS\DRAWINGS\AUTOCAD\CURRENT DRGS\B411 - PL - SK - 350 - P01 - SW STRATEGY

C Environment Agency Groundwater Level Data

B411 Teversham Road, Fulbourn
Groundwater records
Comparison of site records to EA data

Site data			
Date	Monitoring well		
	WS6/6a	WS1 / 1a	WS3/3a
06/06/2014	2.4	1.6	1.5
24/06/2014	0.67	0.95	1.32
28/07/2014	0.7	0.95	1.2
30/07/2014	0.76	0.84	1.28
01/08/2014	0.75	1	1.25
05/02/2015	0.63	0.65	0.92
16/02/2015	0.66	0.75	1
13/03/2015	0.67	0.74	1.03
28/04/2015	0.6	0.79	
28/05/2015	0.59	0.81	1.14
05/06/2015	0.66	0.88	1.08
16/11/2015		0.8	1.1
18/01/2016		1.03	0.68
24/02/2016		0.71	1
23/03/2016		0.98	0.78
19/04/2016		0.68	0.99
20/05/2016		1	1.25

Date comparison by month and year (not day)

EA data		
Fulbourn Fen, EA ref TL55_182		
Date	Level (m AOD)	
29/01/2014 14:11	11.45	AM
28/02/2014 11:11	11.44	AM
18/03/2014 16:14	11.24	AM
24/04/2014 13:37	11.18	AM
28/05/2014 07:59	11.37	AM
25/06/2014 14:30	11.03	M
30/07/2014 13:53	10.98	BM
26/08/2014 11:40	11.32	AM
30/10/2014 14:37	11.22	AM
27/11/2014 13:30	11.38	AM
18/12/2014 14:48	11.33	AM
21/01/2015 08:52	11.3	AM
25/02/2015 14:13	11.3	AM
31/03/2015 14:49	11.23	AM
30/04/2015 07:27	11.15	AM
03/06/2015 12:58	10.97	BM
30/06/2015 15:40	10.85	BM
16/07/2015 12:20	11	BM
13/08/2015 12:23	10.98	BM
24/09/2015 15:27	11.08	AM
23/10/2015 15:42	11.1	AM
24/11/2015 11:43	11.32	AM
22/12/2015 15:33	11.22	AM
28/01/2016 15:04	11.22	AM
25/02/2016 16:33	11.2	AM
23/03/2016 12:37	11.18	AM
27/04/2016 11:26	11.2	AM
20/05/2016 13:09	11.08	AM

Mean level over 10 years (103 readings)
 11.03 m AOD
 AM = above 11.03
 BM = below 11.03
 M = at 11.03

Station name Fulbourn Fen
 Station number TL55_182
 External number ---
 River ---
 Operator ---
 NGR TL5311656100
 Easting 553116
 Northing 256100
 Parameter-name WL [Water Level]
 Parameter Type Groundwater Level
 Time series name EAN/TL55_182/WL/Cmd.RelAbs.P
 Time series unit m
 Time level High-resolution
 Time series type Other
 Equidistant time series no
 Time series value distance ---
 Time series quality Production
 Time series measuring method ---

Period of record in file: 08/06/2012 12:30:00 to 22/02/2022 14:25:00

Quality code description

G = good; E = estimated; S = suspect; U = unchecked; M = missing; C = complete; I = incomplete; Ed = edited; WR = within rating; NR = no rating; EX> = extrapolated upper part; EX< = extrapolated lower part; BL> = beyond upper limit; BL< = beyond lower limit; MH = weir modular (head); NH = weir non modular (head); EH = weir extremely non modular (head); MT = weir modular (tail); NT = weir non modular (tail); ET = weir extremely non modular (tail); MC = weir modular (crest); NC = weir non modular (crest); EC = weir extremely non modular (crest); -H = weir head only; RAS = rastered time stamp; A = apportioned/interpolated; D = dry; SN = snow; T = trace

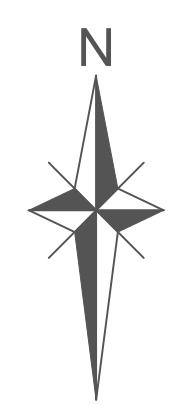
Time stamp	Dip[m]	State of value	Interpolation	GroundwaterLe	State of absolu	Interpolation o	Tags	Comments
08/06/2012 12:30	1.21	G		101	11.06	G	101	
27/06/2012 15:32	1.23	G		101	11.04	G	101	
27/07/2012 12:31	1.19	G		101	11.07	G	101	
03/09/2012 12:30	1.14	G		101	11.12	G	101	
02/10/2012 14:05	3.01	G		101	9.26	G	101	
29/10/2012 13:09	0.98	G		101	11.29	G	101	
21/11/2012 11:50	0.95	G		101	11.32	G	101	
10/12/2012 13:56	1	G		101	11.27	G	101	
30/01/2013 13:08	0.89	G		101	11.37	G	101	
28/02/2013 12:03	0.99	G		101	11.28	G	101	
25/03/2013 14:32	0.95	G		101	11.31	G	101	
11/04/2013 12:20	1.02	G		101	11.24	G	101	
28/05/2013 11:02	1.08	G		101	11.19	G	101	
03/07/2013 11:19	1.26	G		101	11	G	101	
06/08/2013 12:35	1.24	G		101	11.03	G	101	
29/08/2013 13:45	1.29	G		101	10.97	G	101	
26/09/2013 12:26	1.16	G		101	11.1	G	101	
24/10/2013 12:14	1	G		101	11.27	G	101	
05/12/2013 10:40	1.02	G		101	11.25	G	101	
03/01/2014 09:09	0.93	G		101	11.33	G	101	
29/01/2014 14:11	0.82	G		101	11.45	G	101	
28/02/2014 11:11	0.82	G		101	11.44	G	101	
18/03/2014 16:14	1.03	G		101	11.24	G	101	
24/04/2014 13:37	1.08	G		101	11.18	G	101	
28/05/2014 07:59	0.89	G		101	11.37	G	101	

25/06/2014 14:30	1.24 G	101	11.03 G	101
30/07/2014 13:53	1.29 G	101	10.98 G	101
26/08/2014 11:40	0.94 G	101	11.32 G	101
26/08/2014 11:41 ---	M	101 ---	M	101
30/09/2014 12:00 ---	M	101 ---	M	101
30/10/2014 14:36 ---	M	101 ---	M	101
30/10/2014 14:37	1.05 G	101	11.22 G	101
27/11/2014 13:30	0.88 G	101	11.38 G	101
18/12/2014 14:48	0.94 G	101	11.33 G	101
21/01/2015 08:52	0.96 G	101	11.3 G	101
25/02/2015 14:13	0.97 G	101	11.3 G	101
31/03/2015 14:49	1.03 G	101	11.23 G	101
30/04/2015 07:27	1.11 G	101	11.15 G	101
03/06/2015 12:58	1.29 G	101	10.97 G	101
30/06/2015 15:40	1.42 G	101	10.85 G	101
16/07/2015 12:20	1.26 G	101	11 G	101
13/08/2015 12:23	1.28 G	101	10.98 G	101
24/09/2015 15:27	1.18 G	101	11.08 G	101
23/10/2015 15:42	1.17 G	101	11.1 G	101
24/11/2015 11:43	0.95 G	101	11.32 G	101
22/12/2015 15:33	1.04 G	101	11.22 G	101
28/01/2016 15:04	1.05 G	101	11.22 G	101
25/02/2016 16:33	1.06 G	101	11.2 G	101
25/02/2016 16:34 ---	M	101 ---	M	101
23/03/2016 12:37	1.08 G	101	11.18 G	101
27/04/2016 11:26	1.06 G	101	11.2 G	101
20/05/2016 13:09	1.18 G	101	11.08 G	101
29/06/2016 08:47	0.99 G	101	11.27 G	101
26/07/2016 13:18	1.38 G	101	10.89 G	101
08/09/2016 15:11	1.4 G	101	10.86 G	101
30/09/2016 14:59	1.4 G	101	10.86 G	101
20/10/2016 07:04	1.46 G	101	10.8 G	101
24/11/2016 09:47	1.22 G	101	11.04 G	101
21/12/2016 15:51	1.2 G	101	11.07 G	101
25/01/2017 14:23	1.12 G	101	11.14 G	101
24/02/2017 12:57	1 G	101	11.26 G	101
29/03/2017 16:45	1.14 G	101	11.12 G	101
26/04/2017 10:29	1.23 G	101	11.04 G	101
18/05/2017 10:56	0.98 G	101	11.29 G	101
30/06/2017 13:07	1.1 G	101	11.16 G	101
02/08/2017 15:25	1.3 G	101	10.97 G	101
31/08/2017 10:43	1.28 G	101	10.99 G	101
28/09/2017 10:01	1.16 G	101	11.1 G	101
18/10/2017 09:45	1.24 G	101	11.02 G	101
28/11/2017 10:38	1.03 G	101	11.24 G	101
14/12/2017 12:12	0.99 G	101	11.28 G	101
24/01/2018 10:12	0.94 G	101	11.33 G	101
23/02/2018 13:31	0.97 G	101	11.29 G	101

No access, fields closed for grazing

28/03/2018 09:41	0.95 G	101	11.31 G	101
27/04/2018 09:37	0.99 G	101	11.27 G	101
24/05/2018 12:24	1.16 G	101	11.1 G	101
29/06/2018 10:15	1.28 G	101	10.98 G	101
01/08/2018 09:49	1.31 G	101	10.96 G	101
31/08/2018 08:45	1.3 G	101	10.96 G	101
28/09/2018 11:20	1.3 G	101	10.96 G	101
24/10/2018 13:17	1.31 G	101	10.96 G	101
28/11/2018 11:35	1.38 G	101	10.89 G	101
20/12/2018 14:44	1.3 G	101	10.96 G	101
07/06/2019 13:52	1.6 G	101	10.66 G	101
25/07/2019 09:41	3.19 G	101	9.07 G	101
03/10/2019 10:32	2.46 G	101	9.8 G	101
23/10/2019 09:30	2.46 G	101	9.8 G	101
10/01/2020 11:43	1.96 G	101	10.3 G	101
06/03/2020 09:49	1.17 G	101	11.1 G	101
11/09/2020 12:47	1.74 G	101	10.52 G	101
30/09/2020 10:02	1.86 G	101	10.41 G	101
11/11/2020 10:40	1.67 G	101	10.6 G	101
25/11/2020 13:00	1.7 G	101	10.56 G	101
16/12/2020 15:34	1.46 G	101	10.8 G	101
27/01/2021 12:32	0.96 G	101	11.3 G	101
22/02/2021 13:49	0.99 G	101	11.28 G	101
14/04/2021 11:47	1.05 G	101	11.21 G	101
30/04/2021 12:06	1.11 G	101	11.16 G	101
25/05/2021 11:14	1.02 G	101	11.25 G	101
29/06/2021 14:21	1.19 G	101	11.07 G	101
27/08/2021 14:43	1.48 G	101	10.78 G	101
30/09/2021 12:35	1.57 G	101	10.69 G	101
22/10/2021 09:05	1.14 G	101	11.13 G	101
30/11/2021 13:40	1.74 G	101	10.53 G	101
13/01/2022 11:51	1.28 G	101	10.99 G	101
02/02/2022 15:48	1.27 G	101	10.99 G	101
22/02/2022 14:25	1.08 G	101	11.18 G	101

D Drawing B411-PL-SK-351 Flood Levels Plan



KEY	
X.XX	1 in 100 SURFACE WATER FLOOD LEVEL PLUS CLIMATE CHANGE
X.XX	FLOOR LEVEL



NOTES

REV	DESCRIPTION	DE	DR	CH	DATE
DESIGNED BY	DRAWN BY				
-	DP				

SCALE @ A1 SIZE	DATE
D.N.S.	31/03/2022

PROJECT TITLE
**LAND AT TEVERSHAM ROAD,
 FULBOURN, CAMBRIDGESHIRE**

DRAWING TITLE
FLOOD LEVELS PLAN

CLIENT
CASTLEFIELD INTERNATIONAL LTD

CANNON
 CONSULTING ENGINEERS
 Highways, Transport & Infrastructure Planning

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DRAWING NUMBER	REV.
B411 - PL - SK - 351	-

M:\B411 Fulbourn - CAMBS\DRAWINGS\AUTOCAD\CURRENT DRGS\B411 - PL - SK - 351 - 2022 FLOOD LEVELS PLAN

E Commentary on Rule 6 Statement of Case

Commentary on the Rule 6 Statement of Case Paragraphs 22 to 42

Rule 6 Paragraph (copied but not checked)	Comments
<p>22</p> <p>The assessment of flood risk and layout are inseparable, particularly because of the very low-lying position of the Site. Layout, surface water management, and flood risk mitigation are indivisibly linked, both during the design phase and after construction. In our view, if the present layout were to be approved without identifying a solution to the flood risk to surrounding properties, it is highly likely that substantial changes to layout would then be needed at the point of the discharge of conditions 8 and 9. Such changes should not and could not be approved through a discharge of condition and which does not have any consultation requirement. Our view is supported by two Sustainable Drainage Officers working for SCDC. On 16/4/2020 Adam Littler (Interim Sustainable Drainage Officer) wrote: "it is felt the information requested [on modelling of drainage following modifications to layout] is fundamental to the proposed strategy and is therefore required at this stage to ensure sustainable principles are fully examined and can be technically assessed at this point, prior to further design evolution. The landscaping will directly impact the drainage strategy and vice versa. Both aspects need to be considered jointly."</p>	<ol style="list-style-type: none"> 1) Flooding (flood risk) would reasonably be influenced by the extent of the proposed development platforms on which the layout will sit. 2) The 2022 flood modelling confirms that the layout presented with the appeal scheme does not need to be altered in order to avoid increasing flooding of property on or off site. 3) The layout sits within the raised development parcels. The impact of the raised parcels on floodwater was assessed and approved by Simon Bunn the Sustainable Drainage Engineer (SDE) for South Cambridgeshire District Council (SCDC) in their response (of 15/02/2017) to the outline application reference S/0202/17/OL. The response notes that "the proposals are unlikely to increase flood risk elsewhere and will likely reduce flood risk downstream." 4) The August 2020 flood model update to confirm that the RM layout maintained the same space for surface water flooding (requested by Simon Bunn) lead to the "proposal is acceptable" response issued by Chris Grey (the SCDC SDE) on 19/11/2020.
<p>23</p> <p>His colleague, Simon Bunn (Sustainable Drainage Engineer) took a similar view having reviewed a previous iteration of these plans, which, at the time, involved changes to a surface modelling around a play area which was projected to flood. He wrote (14/12/2019): "It appears that the development footprint and proposals have changed since the modelling and the design [...] has been changed This will change the modelling results. The previous modelling cannot be relied on to demonstrate that the risk has been adequately addressed. The current proposals must be remodelled to demonstrate that they are acceptable. It is not acceptable to have broad statements that</p>	<ol style="list-style-type: none"> 1) Refer to Point 4 comment on Paragraph 22. For clarity, the "current proposals" to which Simon Bunn refers are those which were modelled in August 2020. 2) To avoid confusion it should be noted that Simon Bunn provided the earlier responses to the RM application; Adam Littler then took over from Simon Bunn and echoed his responses; and Chris Gray then took over the role and found the information supporting the RM application to be acceptable.

<p>features 'should provide additional capacity for floodwater'. The acceptability of the scheme should be adequately demonstrated through updated and revised modelling."</p>	
<p>24 In view of this, we agree with Simon Bunn and Adam Littler (Sustainable Drainage Engineers) and South Cambridgeshire District Council's Planning Committee that without such modelling one cannot conclude that 'sufficient information has been submitted to demonstrate that the reserved matters scheme can provide a satisfactory scheme of surface water drainage and prevent the increased risk of flooding'.</p>	<p>1) Sufficient information was submitted to allow Chris Gray to find the proposal acceptable in November 2020 (refer to the Point 4 comment on Paragraph 22). The positive response from Chris Gray is the result of the modelling requested by Simon Bunn and repeated by Adam Littler in their earlier responses.</p>
<p>25 The effect of layout, scale and landscaping on drainage and flood risk is also illustrated by the changes made by the appellant in an attempt to address previous flood risk issues. For example, the slope of the south-eastern development platform was tilted north-to-south towards the Cow Lane properties where they previously tilted south-to-north towards the centre of the Site but which caused a flood risk to the park between the two adjacent platforms. The change was first identified by Cannon Engineers' drawing 320 Rev.P01, dated September 2020, in order to try and prevent the flooding of roads within the development. This change to the height and inclination of the development platforms has not been modelled albeit it is obvious that those changes further increase the risk of flooding to the Cow Lane properties. SCDC is unable to determine what the flood risk is as a result of the layout, scale and landscaping proposed by the latest reserved matters submissions.</p>	<p>1) This is not true. As discussed in the modelling reports, the platforms are modelled as obstacles to water. This allows their influence on water (interrupting and displacing water) to be quantified and managed/mitigated. The slope of the platforms does not play a role in their impact on the surface water floodwater flowing onto/through the site from the adjacent land and further afield.</p> <p>2) The "park between the two adjacent platforms" is an identified flood storage area. No effort has been made to prevent water from entering, and being held within it, as it would defeat its purpose.</p> <p>3) The platform areas are represented in the model as blocks which exclude floodwater (this is evident from the images in the various modelling reports which show the platforms as dry. The platforms can effectively be thought of as infinitely high blocks for the purposes of the model.</p>
<p>26 The original flood risk assessment submitted at the time of the OPP is outdated and not based on the currently proposed reserved matter details.</p>	<p>1) The FRA which supported the approved application was not submitted with the RM application. As discussed (in the Point 1 comment on Paragraph 24), the RM layout was supported by an updated flood model.</p>
<p>27 The proposed development lies at the lowest point in the village of Fulbourn, acting as a drainage sump for the western part of the</p>	<p>1) The word "sump" implies a structure that holds water below the level of an outfall. This is a mischaracterisation of the site</p>

<p>village. The hills to the south and the underlying chalk strata are responsible for the underground flow of water towards the site. The flooding that occurs in Thomas Road (just over the other side of Teversham Road) is a salutary reminder of how this part of Fulbourn is at risk. Local residents noted at the 13th October 2021 Planning Committee meeting, that the Site, as existing, is liable to flood and that there is standing water for 6 months or more on some parts of the Site. It was also known that agricultural use of the land is not possible due to the high-water table. The independent report by HR Wallingford, dated August 2020, indicates that the two fields proposed for development, act as a large sump, preventing flooding to surrounding properties. Importantly it notes that Cannon Consulting Engineers, working for the appellant, have substantially underestimated the catchment area, with the true catchment area according to HR Wallingford's LIDAR data being 1.8 times higher than that use in Cannon's modelling.</p>	<p>topography which shows that the site drains to the central watercourse.</p> <ol style="list-style-type: none"> 2) From discussions with Pat Matthews (the SCDC drainage engineer who preceded the SDE team), the Thomas Road flooding is related to the use of a traditional surface water drainage piped sewer network at a depth which allows ingress of groundwater and thus requires pumping. The surface water management scheme at the application site (which will be addressed through Condition 8 of the outline permission) will account for the potentially high groundwater. 3) We assume that the reference to the catchment area is the image from the 2014 Cannon Consulting Engineer's FRA which shows the extent of the Flood Estimation Handbook (FEH) catchment area. As discussed in the H R Wallingford report, this was not used in the flood modelling. It is also worth noting that all of the numerical flood modelling (from the 2016 appeal to date) has been undertaken by H R Wallingford. The outline approval, and acceptance of the RM application by the SCDC SDE is based on the H R Wallingford modelling. 4) For clarity, the use of the word "notes" implies that the phrase "Cannon Consulting Engineers... have [SIC] substantially underestimated the catchment" is derived from the H R Wallingford report, whereas it is not. 5) It is worth noting that the August 2020 flood modelling referred to in this paragraph is the updated flood modelling which supported the RM application. It is an update of the previous H R Wallingford model which supported the previous planning appeal, and the 2017 outline planning application.
<p>28 Currently, this important natural drainage sump can retain excess water over a large area, allowing it to dissipate slowly into the chalk stream and by evaporation, thus protecting surrounding properties. If the development proceeds as proposed, it will be lost through the significant reduction in grassland and the</p>	<ol style="list-style-type: none"> 1) As discussed in the preceding paragraphs, the development proposals include space for the continued acceptance of surface water floodwater onto this site.

<p>re-orientation of the relief of the land that is proposed in the south-eastern part of the development.</p>	
<p>29 At no stage in the nine iterations of the drainage plans submitted has it been shown that surrounding properties will not flood. Indeed, HR Wallingford's report indicates that they are likely to flood. The LLFA is plainly wrong in asserting that "sufficient information has been provided to demonstrate that the layout of the site could accommodate a suitable drainage solution" (paragraphs 231 and 311 of the October 2021 Committee report). Their view contradicts that of two Sustainable Drainage Engineers assessing similarly underassessed changes to surface water flows in 2019 and 2020 (see above). Recent flooding of 12 adjacent existing properties in Linton to the development at Horseheath Road illustrates the very real concern and risk. In that case, the LLFA team stated that there was no risk of flooding. The flood occurred 8 weeks later. Thus, we have no confidence in LLFA's ability to scrutinise the plans. Accordingly, we strongly objected to the LLFA's approval of the RMA and intention to resolve all the obvious issues with this Site during the discharge of conditions stage, which does not require public consultation. This view was shared by the Planning Committee following sustained, data-driven, local opposition to the appellant's inadequate flood risk mitigation strategy.</p>	<ol style="list-style-type: none"> 1) We assume that the opening to this paragraph refers to drawing SK320. This is a flood level/floor level plan not a drainage plan. SK320 was prepared during our discussions with the SCDC SDE Chris Grey to demonstrate finished flood levels within the development (allowing SCDC to accept the RM layout from a flood risk perspective). 2) The updated flood modelling in Appendix A of the Cannon Consulting Engineers Proof of Evidence demonstrates that the layout presented with the appeal scheme can be delivered without causing off-site property flooding. 3) We assume that the two SCDC SDEs mentioned are Simon Bunn and Adam Littler and not Chris Gray, the third SDE who found the RM layout acceptable. 4) We are unable to speculate as to the causes of the reported flooding in Linton.
<p>30 The proposed central open spaces, including children's play area, are designed to flood. An interesting question arises, regarding who might want to live in a development, which has the potential, in certain weather conditions, to have flowing flood waters in an area with children's play equipment. Local residents are horrified by this proposal and the potential impact on health and well-being of existing and new residents.</p>	<ol style="list-style-type: none"> 1) For clarity, the Local Equipped Area of Play is to be raised (this is why it is represented in the August 2020 flood model as part of the platforms). 2) As a general comment, sales of houses in surface water flood areas, alongside rivers, streams, ditches, wetlands (such as Poorwell Water) are not unusual.
<p>31 The LLFA view gives no further confidence: "Appropriate signage should be used in multi-</p>	<ol style="list-style-type: none"> 1) Education boards to explain how sustainable drainage and flood management areas will function are part of

<p>function open space areas that would normally be used for recreation but infrequently can flood during extreme events. The signage should clearly explain the use of such areas for flood control and recreation. It should be fully visible so that infrequent flood inundation does not cause alarm. Signage should not be used as a replacement for appropriate design."</p>	<p>good design and help develop ownership and understanding of the place.</p>
<p>32 The final submitted version of plans (April/ July 2021 amendments) are also in breach of CC/9 of South Cambridgeshire Local Plan. This states that finished floor levels should be 300 mm above the levels of the roads. This is to prevent water ingress into properties from roads during periods when there is significant surface water. Furthermore, finished floor levels should be 300 mm above the predicted 100 year +40% flood levels. As the lowest lying and wettest part of the village of Fulbourn that is liable to flood, it is paramount that this guidance is followed rigorously at this Site.</p>	<ol style="list-style-type: none"> 1) The flood and floor level plan (SK320) was developed and discussed with, and accepted by, SCDC SDE Chris Gray. 2) For context, the full text of CC/9 part b states: <i>"b. Floor levels are 300mm above the 1 in 100 year flood level plus an allowance for climate change where appropriate and where appropriate and practicable also 300mm above adjacent highway levels."</i> The phrases "where appropriate" and "where appropriate and practicable" allow for the SCDC SDE to apply a flexible approach in their decision making which is evident from the SCDC acceptance. 3) Notwithstanding the acceptance of the RM layout by the SCDC SDE, the most recently submitted floor levels are 300 mm above the modelled flood levels.
<p>33 For multiple proposed development properties, the finished floor levels are not 300 mm above the levels of the roads. They have been assessed in the OR against the incorrect lower figure of 150 mm and at least 16 buildings fail even that. CC/9 also mandates buildings should be 300mm above flood levels and at least 8 buildings fail that. Paragraph 42 of the OR to the 13th October 2021 Planning Committee meeting was completely incorrect on both the above points relating to CC/9, but Planning Committee members recognised this error. Proposed dwellings cannot be raised further to avoid the flood risk, as they are already on 900mm platforms, which would be more imposing and would increase the flood risk to surrounding properties even further. This further demonstrates the inseparability of the assessment of layout and surface water management at this Site.</p>	<ol style="list-style-type: none"> 1) Refer to comments 1 to 3 above on Paragraph 32.

<p>34</p> <p>The challenges of flood water management at the Site were discussed extensively in the 13th October 2021 Planning Committee meeting. The flood levels shown on the appellant's own documents from April 2021 show a severe flood risk to multiple surrounding houses in Cow Lane, with predicted 100 year +40% flood water levels shown to be 8 cm (and predicted 1000 year flood water levels 12cm) above the floor levels at 60 Cow Lane, for example. This can be calculated as follows: Floor levels at 60 Cow Lane are 20 cm (0.2m) above the ground level, which is 9.89m above sea level, according to the developer's plans, giving floor levels of 10.09 above sea level. Meanwhile, the predicted 100 year +40% flood water levels are at 10.17 m, which is 8 cm above the floor levels and 28cm above ground level at 60 Cow Lane. The risk is similar for many of the other Cow Lane properties that abut the southern boundary of the development. It should be noted, that due to extension of 60 Cow Lane in 2018, it is 8 metres nearer to the development boundary shown on the developer's outdated plans, being only 7m from the boundary.</p>	<ol style="list-style-type: none"> 1) The maximum post development flood depths predicted by the flood modelling (both the 2016 flood modelling and the 2020 flood modelling supporting the RM application) to the south of the eastern half of the site (between Cow Lane and the site boundary) is up to 200 mm. This is shown by the different shades of blue on the images representing five depth bands of water (2 mm to 50 mm, 50 mm to 100 mm, 100 mm to 200 mm, 200 mm to 500 mm, and 500 mm to 1,000 mm). The majority of the flooding in the area in question falls in the two shallower bands (up to 50 mm, and between 50 mm and 100 mm). Depths of up to 200 mm would not typically be described as severe (hence Simon Bunn's positive consultation response supporting the outline planning permission in 2017). 2) The flood model simulates the flow of water over digital terrain. Flood levels can therefore vary with the underlying topography as an example of one parameter which can influence water levels. A flood level in one location is not applicable to a different area.
<p>35</p> <p>Extensive concerns have been raised by Fulbourn residents about the severely increased flood risk to surrounding properties as a consequence of this development, not least because Cannon Consulting Engineers' own plans provide evidence of this flood risk. In August 2020 a 'Review of Surface Water Flood Management, Fulbourn' was published by HR Wallingford (an independent engineering and environmental hydraulics organisation) for Cannon Consulting Engineers, the appellant's consultant. This clearly showed that the risk of flooding both on and off the Site was real, that the drainage catchment area of the Site had been substantially underestimated by Cannon Consulting Engineers, and that the flood management scheme prepared by Cannon was not fit for purpose.</p>	<ol style="list-style-type: none"> 1) Refer to comments which address this paragraph.

<p>36</p> <p>As mentioned above, multiple amendments to the surface water and drainage scheme were subsequently proposed by Cannon, primarily to reduce the potential depth of flooding in the central Linear Park and Meadow Park areas onsite and their adjacent roads and paths, to deal with the concerns of the LLFA that flooded roads and paths could impede escape from the Site in the event of a severe weather event. However, to achieve this, the southern raised development platform, whose levels originally fell from south to north (i.e., towards the Linear and Meadow Park), was re-orientated to fall towards the south (i.e., towards the existing properties in Cow Lane), increasing the risk of flooding to these properties. This was again confirmed in a 'Layout Update' document by Cannon Engineering, dated 13 April 2021, and their drawing B411-PL-SK-320 Rev.P09, 14 April 2021. Revision 01, dated 22 September 2020. Deliberately pouring flood water towards the Cow Lane properties in this way will inevitably worsen the already severe flood risk to them, as a consequence of this development. No modelling of the effect of this altered slope has been provided by the developer.</p>	<ol style="list-style-type: none"> 1) For clarity, the term surface water drainage relates to the management of surface water runoff generated by impermeable cover (roofs, roads, hardstanding, etc). This was, and will continue to be, addressed as part of Condition 8 of the outline planning permission. Surface water from the developed catchment will be controlled at source in attenuation facilities for each of the sub-catchments and discharged at an attenuated rate. 2) The drawing discussed in this paragraph (SK320) is the flood level/floor level comparison plan which was developed in liaison with Chris Gray, the SCDC SDE. The iterations of the drawing were to agree the locations of levels with SCDC and the height of floor levels relative to said levels. At no point were levels designed to 'tip' the platforms in any particular direction. 3) As discussed previously, the impact of the platforms on the water flowing onto the site from land outside of the boundary is assessed by preventing the platforms from flooding. This effectively removes the area of the platforms from conveying the water and thus simulates the impact of 'lost floodplain'.
<p>37</p> <p>Further, in response to resident and Council queries about the appropriateness of infiltration, the appellant in July 2021, added an underground stone-lined trench or culvert system in an attempt to drain the Cow Lane Flood Basin, rather than relying on infiltration. Residents noted the lack of flood modelling of this newly proposed arrangement. In particular, no modelling has been provided to assure residents that the outflow point of the newly proposed culvert into the chalk stream, close to its origin from the Poor Well area, will not cause retrograde flow of large volumes of development site run-off water into this Conservation Area. Furthermore, the total outflow rate from the development site is restricted as part of the OPP, to minimise downstream flood risk from rapid run-off, and no modelling has been performed to determine the likelihood of the Cow Lane Flood Basin plus stone trench arrangement increasing the total</p>	<ol style="list-style-type: none"> 1) Culvert is an incorrect term to apply to the filter drain proposed (as noted on drawing B411-PL-SK-321-P02 this feature is a stone filled trench, not a culvert). A filter trench allows for a lower flow whereas a culvert is typically employed when a higher rate of flow is required. 2) In addition to the above, the flood management basin on the southern boundary does not drain runoff from the site and therefore cannot channel runoff into the stream.

<p>permitted flow rate off the Site beyond the greenfield discharge rate.</p>	
<p>38 Local residents requested a series of detailed sections through the southern development platform, the various floodwater basins, and the properties in Cow Lane, suitably marked with the proposed ground levels, the finished floor levels, the floodwater basin levels, and the predicted flood levels (verified by independent floodwater modelling), to clearly identify the flood risks. Some further information was received, but there were multiple inconsistencies of 30-40cm between drawings, for the heights of land in key locations along the southern boundary and the area of greatest flood risk to adjacent properties. Given that the 100 year +40% flood risk to some of the Cow Lane properties is already 20-30cm above the ground levels (and 8-12 cm above an existing property's floor levels), discrepancies in land relief of 30-40cm are exceptionally serious. In the diagram in Cannon Consulting Engineers document denoted B411 dated 13 April 2021, the inconsistencies are more than 7 metres, with the land level at 60 Cow Lane being marked as 17.28m above sea level, rather than the 9.89m given for this point elsewhere. Furthermore, all the figures south of the development boundary, range between 15.51 and 17.28m. We can only assume that the appellant measured the top of house roofs rather than ground levels? Inconsistencies of this nature cannot be permitted.</p>	<ol style="list-style-type: none"> 1) The sections were provided for the LLFA (following a meeting with them) to show the relationship between the site and surrounding land and should not be interrogated in detail. 2) The roof levels shown on the topographical survey are noted as such (they are marked with RL on the survey). 3) As discussed in the H R Wallingford report the ground model outside of the site uses LIDAR data.
<p>39 Much of the data used in earlier modelling carried out by the appellant is also incomplete, with data from the wetter year during which measurements were taken being unavailable from the highest reading borehole, WS6a, the borehole apparently having been "lost" and not re-dug, although re-digging would (we believe) take under 30 minutes. However, for an entire 6 month period, no one could find the time required to re-dig it. Additionally, we note that the years in which data were presented are those with lower rainfall than average, and so may yield biased estimates of true groundwater levels. If used in modelling, such biased</p>	<ol style="list-style-type: none"> 1) Groundwater levels are not an input in the surface water flood modelling and the levels are not therefore material to the model.

<p>estimates would result in underestimation of flood risks.</p>	
<p>40 In an attempt to corroborate the appellant's borehole data, local residents measured from borehole WS1a (located at What3Words location https://w3w.co/vampire.bloodshot.richer) in June 2021. While the measurement given by the appellant for the water table position for this bore hole in June is 88cm below surface level, our measurement of 43cm, was 45cm higher than the appellant's data. The measurements were taken by residents and independently confirmed. They were also re-confirmed by Mr Michael Sexton, Senior Planning Officer at SCDC handling the application when he visited on 6th June 2021 and took photographs of this measurement. Further measurements were taken by the residents in March 2022, confirming the water table to be 40cm below the surface in bore hole WS1a, compared with the appellant's stated level of 74cm in March.</p>	<p>1) The groundwater levels do not play a role in the flood water modelling across the digital terrain.</p>
<p>41 Finally, some of the recent plans appear to mix-up current and proposed ground levels, which gives the impression that the development properties are lower lying than existing properties. However with the substantially raised development platforms now proposed, this is not the case.</p>	<p>1) It is difficult to respond to this point without specific reference to the drawings in question. However, the principle of development has already been accepted in this location as a result of new dwellings being on raised development platforms.</p>
<p>42 Overall, the Appellant has failed to demonstrate that the proposed layout, scale and landscaping proposals are capable of providing a satisfactory method of water drainage which does not increase the risk of flooding to the new properties and those which currently exist. Such a failure is patently unacceptable and contrary to national and local policy. In particular it can be noted that the NPPF provides that where development is necessary in areas at risk of flooding 'development should be made safe for its lifetime without increasing flood risk elsewhere' (para.159). Further, when planning applications are determined, decision-makers</p>	<p>1) These points are addressed in Section 5 of the Proof of Evidence.</p>

<p>should 'ensure that flood risk is not increased elsewhere' and development must demonstrate that (a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; (b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment; (c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; (d) any residual risk can be safely managed; and (e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan (para 167). The proposal also breaches policies CC7, CC8 and CC9 of the South Cambridgeshire Local Plan 2018 as set out in the RfR.</p>	
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