Proposed Residential Development at Land off Cossington Road, Sileby, Leicestershire

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1 INTRODUCTION

1.1 BACKGROUND

1.1.1 Since January 2017 I have been employed as a Civil Engineer by Residential and Commercial Engineering Ltd (RACE) and I currently hold the post of Director of Engineering. I have worked as a Civil Engineer since I graduated in June 1991, working both as a consultant and also directly for numerous developers over the course of my 30year career.

1.1.2 I hold a Bachelor of Engineering with honours in Civil Engineering from the University of Birmingham.

1.1.3 I am member of the Chartered Institution of Highways & Transportation. I am also an Incorporated member of the Association for Project Safety.

1.1.4 Residential and Commercial Engineering Ltd (**RACE**) were commissioned to undertake a Flood Risk Assessment (FRA) and accompanying Drainage Strategy to support a proposed outline planning application for the construction of residential dwellings on a Greenfield site, off Cossington Road, Sileby. RACE was originally instructed in November 2020, and have subsequently been involved in updating the FRA and accompanying drainage strategy on 2 occasions, January 2021 and July 2021.

1.1.5 The 2 documents produced by RACE and submitted in support of the planning application under appeal are: -

i. RACE/DWH/CRS/FRA3 - Flood Risk Assessment

ii. RACE/DWH/CRS_SK_ENG_003 Rev # Preliminary Drainage Strategy Option 2

1.1.6 The planning application was refused by Planning Committee on 17 September 2021. There were no drainage or Flooding reasons for refusal.

1.1.7 I have reviewed the planning documentation listed in 1.15 above, which was submitted with the outline planning application and stand by the findings of the FRA and the drainage strategy.

1.1.8 Our evidence, based on the documents produced, will address the reasons why I consider that the proposed development suitably considers the existing flood issues relating to the site and provides a suitable drainage strategy that not only takes these considerations into account, but also protects against any potential impact of the development on flooding/drainage grounds whilst providing some alleviation to the current flooding issues identified.

1.1.9 We will also address the concerns highlighted within the third-party representations regarding current and potential future flooding.

1.2 FLOOD RISK

1.2.1 The Flood Risk Assessment produced in November 2020 and subsequently updated in January and July 2021 has identified that the site is primarily located within Flood Zone 1, meaning it falls into a low-risk area for flooding (i.e. 0.1% risk of flooding or less than 1 in 1000yrs). This was based on both Environment Agency (EA) mapping, but also the site-specific detailed hydraulic modelling of the un-named watercourse undertaken by JBA Consulting in June 2020.

1.2.2 It is acknowledged that although the hydraulic modelling concludes that the total proposed development area falls outside of Flood Zone 3, there is a small area at the site entrance where the site falls into Flood Zone 2. The Drainage Strategy (RACE/DWH/CRS_SK_ENG_003 Rev #) identifies the extent of Flood Zone 2 (as well as Flood Zone 3 plus 50% allowance for climate change). It also identifies that subsequent flood compensatory works will be required in order to raise levels in flood zone 2 to accommodate the attenuation pond, plots 1 to 4 and the site entrance. This affected area is approximately 3,000m^2. Based on the red-line boundary of the application, there is significant area of the site currently not incorporated in the development area and outside of flood zone 2 & 3 where compensatory works could be accommodated (approximately 27,000m^2). This area will be fully within the control of the developer.

1.2.3 In addition to the above the FRA states (in paragraph 4.1.1) that the minimum floor level for the site should be 600mm above the 1 in 1000yr flood line, whereas in their consultation response, dated 6 April 2021 (EA Ref: LT/2021/126030/01-L01), the EA only require 600mm above the 100yr+50%; therefore, the proposals submitted actually exceed the requirements set out the proposed conditions proposed by the EA.

1.2.4 As detailed in the FRA there are no other identified sources of Flooding affecting the site, and the indicated mitigation works are compliant with the requirements of the proposed conditions requested by the EA.

2 DRAINAGE STRATEGY

2.1 EXISTING SITE FLOWS

2.1.1 In accordance with Charnwood Borough Council's Design Supplementary Planning (January 2020) and Policy CS16, the assessment of existing site flows has been undertaken for both the FRA and Drainage Strategy. The design approach has been to mimic the existing greenfield run-off from the site, thus minimising the impact of the new development on the existing surroundings.

2.1.2 The existing greenfield flows was calculated using the recognised methodology of IH124 "Flood estimation for small attachments". Using ICP SUDS software by Micro-Drainage (a derivative of IH 124) it was calculated that the equivalent greenfield run-off (Qbar) at the site location was

4.4 l/s per hectare (see FRA Appendix E). Based on a development area of **4.156 Ha**, this gives an existing run-off rate of **18.3 l/s.**

2.1.3 It should be noted for larger storm events of 30 and 100years, the equivalent greenfield run-off increases to **8.6 l/s** per hectare and **11.3 l/s** per hectare respectively (see FRA Appendix E).

2.2 PROPOSED SITE FLOWS

2.2.1 In accordance with current planning policy the Drainage Strategy for the site is to mimic the greenfield run-off from the site to pre-development levels, and attenuating flows from the development to this rate for all storms event up to and including 1 in 100year (+40% allowance for climate change). This approach is outlined in section 10.2 of the FRA.

2.2.2 It should be noted that the above approach actually provides significant betterment against the existing greenfield run-off from the site. The proposed development will discharge at **4.4 l/s** per hectare for all storm events up to and include 100year (+40%). If the site remained undeveloped it is calculated that the site, per hectare, would discharge at **8.6 l/s** for a 30year event, and **11.3 l/s** for a 100year event, and by extrapolation **15.8 l/s** for a 100year (+40%). The table below shows the improvement that the post-development surface water discharge will provide:

Storm Event	Existing run-off rate (l/s per Ha)	Proposed discharge rate (l/s per Ha)	Percentage Betterment
Qbar	4.4	4.4	**0%**
30year	8.6	4.4	**49%**
100year	11.3	4.4	**61%**
100year + 40%	15.8	4.4	**72%**

2.2.3 For storm events greater than a 1 in 30year the above table clearly shows that the discharge from the site post-development will be controlled to a rate giving over a 50% betterment on current run-off from the site. This fundamentally proves that the development will actually provide benefit to the current flooding issues raised. For example, for a 30year 15min storm event the existing site, per hectare, would generate 7,740 litres (7.74m^3) of overland flow (8.6 x 60 x 15), whereas the proposed site, per hectare, generates 3,960 litres (4.4 x 60 x 15), or 3.96m^3, which will be directed into the sewer system.

2.2.4 By controlling the discharge from the site to existing run-off rate, it is necessary to provide storage on-site to 'hold' the additional run-off within the site. The required volume has been calculated within the FRA (see table 11.1) and the proposed open detention pond indicated on the Drainage Strategy Plan (Eng_003 Rev #) provides this volume. This calculated volume takes into account of potential additional impermeable areas set aside for possible future extensions/conservatories, drive widening etc (by increasing the impermeable area by 10% in

accordance with the planning guidance requirements of providing an allowance for urban creep – see Section 10.2 of the FRA).

2.2.5 The calculation of the discharge rate for the site, along with the proposed attenuation were presented to, and approved in principle, by the Local Lead Flood Authority (LLFA), the EA and Severn Trent Water (STW) [see Consultee response from LLFA (dated 01/09/2021); EA (dated 06/04/2021) and email from STW (dated 20/08/21)].

2.3 OUTFALL LOCATION

2.3.1 For surface water discharge from new developments, the selection of a suitable outfall has to follow a nationally recognised hierarchy as follows: -

i. Into the Ground (Infiltration)

ii. To surface water body (i.e. watercourse)

iii. To a surface water sewer, highway drain, or another suitable drainage system.

2.3.2 Based on the ground conditions, the FRA identified that draining the site into the ground, via infiltration, is not viable due to the cohesive nature of the soil. The FRA also was able to rule out that it was not viable to connect to the nearest watercourse (located south of the site) due to the topography along the most practicable outfall route not give sufficient cover over the outfall pipes.

2.3.3 The original FRA identified a potential outfall into a public sewer, based on STW records located within the verge just outside the north-west corner (MH3104 – see FRA Appendix J). Subsequent CCTV survey of the sewers identified that the STW sewer records were incorrect and that this chamber was actually a highway drain draining to the south along Cossington Road. The FRA and the Drainage Strategy were subsequently updated in July 2021 to identify an alternative outfall route (as indicated on RACE/DWH/CRS_SK_ENG_003 Rev # Preliminary Drainage Strategy Option 2).

2.3.4 The updated FRA and Drainage Strategy were submitted to the LLFA and STW with both parties providing approval to these proposals, as set out the LLFA consultation response dated 1 September 2021 and the email from STW (dated 20/08/21). These approvals are also reciprocated in Planning Officer's Report dated 3 September 2021 (see section Flooding and Drainage).

2.4 SUDS TECHNIQUES

2.4.1 The adopted Design Supplementary Planning Document (dated January 2020) identifies any new development must consider Sustainable Drainage Systems within the design (see section

3.130). Based on the SUDS Manual (CIRIA C753) a minimum of 2 treatments should be incorporated into the design.

2.4.2 The FRA clearly identifies the use of 2 SUDS features to provide the following benefits: -

i. Reduce the cause and impact of flooding

ii. Remove pollutants from run-off

iii. Utilise water management with green spaces to provide amenity, recreation and wildlife.

2.4.3 The FRA also identifies that water butts, permeable paving, in addition to the attenuation pond will provide the suitable level of treatment from the site.

2.4.4 These proposals have been submitted and accepted by the LLFA and Planning authority as complying with the requirements under CS16 and the Design Supplementary Planning Document.

2.5 FOUL FLOWS

2.5.1 Following consultation with STW (see FRA Appendix J) the FRA identified that a gravity connection into the public foul sewer located within Cossington Road would be an acceptable outfall location for the foul discharge from the site. Based on the gradient of the sewer immediately downstream of the proposed connection the 150mm pipe has a capacity of 32.9l/s. STW have identified that the foul discharge from 158 dwellings would be 2.5 l/s (Developer Enquiry Response dated 1 December 2020 – FRA Appendix J), therefore they have confirmed that there is sufficient capacity and a connection into this public sewer is acceptable. It should also be noted that the sewer does upsize to a 225mm pipe in the next pipe length, providing even more capacity.

2.5.2 The principles and connection location were identified within the FRA and Drainage Strategy which have been accepted by the LLFA, STW and the Planning Authority.

3 THIRD PARTY REPRESENTATIONS

3.1 KEY AREAS OF CONCERN

3.1.1 It is acknowledged that the have been a significant number of third-party representations made with regards to this appeal, and a number of these have based their objections on the current flooding issues experienced in the locality.

3.1.2 There are a number of different issues raised in the representations, but they can be summarised as follows: -

a) The existing site floods and extent of the flooding

b) The Development will increase pressure on an already overflowing drainage system

c) Increased development, means increased run-off, meaning increased Flood Risk

d) Loss of natural drainage field/ land to absorb rainfall due to being greenfield. Also, there is no consideration for topography of site and where surface water run-off currently flows

e) No consideration for future strength or frequency of heavy rainfall

f) Concerns about Future Maintenance/ management of attenuation pond and viability of SUDS features to provide storage in the long-term.

g) Suitable planning conditions

h) Foul outfall concerns.

3.2 RESPONSES

3.2.1 In response to the drainage and flooding third-party representations, I comment as follows: -

a) The FRA, along with Drainage Strategy, clearly acknowledges the existing flooding within areas of the site and takes into account the extent of the flooding as modelled by JBA Consulting in June 2020. The results of this detailed modelling are shown in all documents and show that the majority of the proposed development area lays outside of the modelled flood zones. In addition, the necessary mitigation measures for the affected areas of the site have been identified and accepted in principle by both the LLFA and the EA.

b) As detailed in section 2.2 above, the drainage strategy proposed for this development is based on mimicking the existing run-off from the greenfield for ALL events up to and including the 100yr (+40% allowance for climate change). Although the proposal is to connect onto the existing public sewer system, it also through diversion/improvement works, proposing to increase the size of the existing sewers thus improving capacity in the existing system (i.e. upsizing a 225mm to a 300mm). This will be subject to detailed design and agreement with STW as the statutory authority currently responsible for the public sewers.

c) There is a misconception that new development means more hard impermeable areas, thus more run-off and as a result a higher risk of flooding. In actual fact, by following current national and local statutory guidelines, the introduction of a new development can

actually reduce run-off and therefore reduce the risk of flooding. The table in paragraph 2.2.2 actual shows that post-development the flows from the site will provide between a 50% and 72% betterment on the existing run-off from the greenfield for larger storm events. This will reduce the run-off from the field associated with the development, thus reducing the contributing overland flows into the watercourse which were identified as the principal cause of the flooding affecting Cossington in October 2019. This design approach has been submitted and approved by the LLFA, the EA and STW.

d) The FRA has analysed the ground conditions on the proposed development, and as indicated within some third-party responses, has identified that the underlaying soils are cohesive in nature (i.e. clay). Based on this the FRA has ruled out infiltration as a viable drainage solution, which by implication means that the current benefits of infiltration of the existing site is considered negligible. In addition, by identifying that infiltration of the ground as minimal it indicates that the majority of the rainfall landing on the site leaves via surface run-off. As identified in some representations, the topography of the site falls considerably in 2 directions. This existing topography directs the overland run-off from the site towards the watercourse, as well as to a low spot adjacent to Cossington Road. In periods of heavy rain this low spot is reported to fill up to the extent that it overflows onto Cossington Road, causing partial blockage of the road. We are also aware of the previous flooding recorded in October 2019 due to the watercourse breaking its banks. The proposed development will direct these currently uncontrolled overland flows into the proposed on-site sewer system, which in turn will then discharge those flows at a controlled rate which is well below those which currently occur (see table at Paragraph 2.2.2). This means that the current identified areas of flood risk are alleviated, or even eliminated. Also, when calculating the proposed discharge rate, based on the equivalent existing greenfield run-off, the formula it is acknowledged that it doesn't take into account the topography of the site; However, in doing so, it is professionally recognised that the final discharge rate calculated is lower than it would be if the slope of the ground was factored in. This, therefore, adds an additional safety factor into the design.

e) The modelling, analysis and evaluation undertaken as part of the FRA and Drainage Strategy follow national guidance in relation to the increased frequency and severity of storm events. The on-site sewer system is designed to cater for a 1 in 100year storm event with its duration varying from 15mins to 24hours and to then be able to operate unhindered, and without risk of flooding of properties (both new and existing), for flows 40% greater than those for a 100year storm event. This is in accordance with current National and Local policies. This approach has been submitted and approved by the LLFA, the EA, and STW. It has also been accepted by the Planning Authority (see Planning officer's Report dated 3 September 2021, section titled Flooding and Drainage).

f) It was indicated that the developer did not have confidence in the robustness of their design as they were proposing to hand off responsibility of the future maintenance of the attenuation pond to a third-party. In actual fact this is standard practice, as the proposed third-parties (Local Authority, Severn Trent or a Management company) are better placed to maintain these features long-term as they would be able to add these to their existing maintenance portfolio. The current changes in regulations in relation to sewer adoption also now allows the Water Authorities (STW in this case) to adopt open ponds as part of the S104 process. This means that the whole of the surface water sewer system could come under umbrella of the single entity rather than some-one be responsible for the sewers and some-one else the pond. By proposing this the developer is not shirking responsibility, as any of the adopting parties will require proof that the system designed/installed is robust and complies with all the current regulations. It also needs to be noted that only the pond will provide storage for the surface water run-off from the site (and has been sized accordingly). The other SUDS features, water butts and permeable pavements, are being proposed to provide a water quality benefit rather than storage provision.

g) As part of the representations the suitability of the planning conditions proposed by the EA was challenged. It was argued that the proposed conditions, especially the third one "no raising of ground levels within Flood Zones 2 or 3 without the provision of floodplain compensation" does not meet the NPPF tests. Firstly, it should be noted that the planning application was for an outline approval thus any detailed design of any mitigation works would be dealt with under a reserved matters application. The condition is actually a standard condition issued the EA for these types of development where the existing flood plain may be affected. Both the EA and the Developer understand the requirements of provision of any mitigation, and what works will be required to obtain approval from the EA and subsequently obtain discharge of such a condition. In relation to Developer not being in control of the land necessary to undertake the works I have outlined in paragraph 1.2.2 above that the developer has sufficient land in their control to be able to provide any necessary flood compensation.

h) The proposed outfall location for the foul sewers from the development have been identified and submitted to STW. STW in their Developer Enquiry Response (FRA Appendix J) confirmed that the proposed location was acceptable and that the existing public sewer system has capacity. In relation to the comparison of pipe sizes and the catchments that they serve, it should be noted that the capacity of any sewer pipe is based on the gradient it is laid at as well as the pipe size itself. The 150mm pipe immediately downstream of the proposed connection is laid at a gradient of 1 in 40 (from STW sewer records) and the next pipe downstream of this upsizes to a 225mm pipe, so the comparison of cross-sectional area doesn't take all the factors into account.