HCD Limited
Haywood Industrial Estate
Wellington
Hereford
HR4 8DZ

52.131864 -2.726531

Flood Risk Assessment

S14-139/FRA
October 2018

Revision 2

Prepared by :

Southwest Environmental Limited
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London
EC1A 9ET

On behalf of :

HCD Limited
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Wellington
Hereford
HR4 8DZ

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Contents

Chapters and Appendices

1.0 Introduction

Acting on instructions from HCD Limited a Flood Risk Assessment (FRA) is to be conducted in connection with HCD's Operations at Haywood Industrial Estate. The proposed site is situated within **Flood Zone 1,** with a very slight incursion in to zones 2 and 3 in the site's south west corner. A site location plan is included within **Appendix 1**. This report was revised pending consultee comments relating to previous application 181468. This flood risk assessment is authored to cover both PP-07295576 (Reapplication) and PP-07295581 (Workshop Application).

This FRA presents a review of the existing available flood-related information and sets out the requirements of The Planning Practice Guidance and those of the Environment Agency (EA) and the Local Planning Authority (LPA) in relation to flood risk and limited drainage.

2.0 Scope

This FRA is prepared for the purposes of providing a generalised indication of the potential flood risk to the site, and to identify whether there are any flooding or surface water management issues relating to the development site that may warrant further consideration.

The report is based on information including Strategic Flood Risk Assessments (SFRA), EA Flood Maps, and consultations with the EA and LPA. A third party data set (EA Corporate Services Data Pack) is also used.

March 2014 saw the introduction of The Planning Practice Guidance. Guidance specific to flood risk assessment first given in "Technical Guidance to the National Planning Policy Framework (TGPPG)", has now been transposed in to the html PPG pages that are published on gov.uk.

3.0 Site Summary

At present the site operates under a Bespoke Waste Transfer Permit (EPR/BB3706MV). The current limit on annual through-put as stipulated in the permit is 70,000 tons. There are some hard standing areas, and paved areas. With parked machinery and also stockpiled construction wastes and soil substitutes.

3.1 Site Location

Site Address	Haywood Industrial Estate Wellington Hereford HR4 8DZ
Grid Reference	52.131864 -2.726531[1]

3.2 Proposed Development

[1] https://goo.gl/maps/c8LAJ6iweDP2

The proposed development would see the construction of a building for the sorting of waste materials. A site layout plan is shown in **Appendix 1**.

4.0 National and Local Policy

4.1 Planning Practice Guidance

The Planning Practice Guidance (PPG) referred to in this report was issued in March 2014. Flood risk assessment is explained more fully in the Technical Guidance Document.

The stated aim of PPG is to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk.

4.1.1 Flood Risk Vulnerability

The Flood Risk Vulnerability Classification for the proposed development has been determined in accordance with Table 2 in PPG. It is considered "*Less Vulnerable*".

4.1.2 Flood Risk Vulnerability and Flood Zone 'Compatibility'

Table 2 in TGPPG states that developments deemed as '*Less Vulnerable'* are appropriate for areas classified as within Flood Zone 1.

4.2 Environment Agency Flood Risk Standing Advice

Environment Agency Flood Risk Standing Advice is designed to help:

- Find out whether an application is lower risk;
- decide when to consult EA;
- determine what the consultation should contain;
- understand how to make a decision on lower-risk sites and
- know what information is required to make an assessment of flood risk.

4.3 SFRA Principals

The SFRA includes details of policy considerations and sets out flood risk management objectives.

i) The management of Surface Water via SUDs;

> *"The management of rainfall (surface water) is considered an essential element for reducing future flood risk to both the site and it surroundings, The Environment Agency expect attenuation of runoff from development sites to be restricted to green field rates and SUDs provide an opportunity for achieving this."*

ii) Improve Flood Awareness and Emergency Planning;

> *"Flood warnings are issued using a set of four codes, each indicating the level of risk with respect to flooding."*

In addition the SFRA includes guidance for the application of SUDS for new developments, and recommends that the future ownership and management is addressed at an early stage.

5.0 Climate Change

Additional considerations incorporated on the migration of policy from PPS25 to PPG includes quantitative considerations for the effects of climate change.

> *"In preparing . . . . a site-specific flood risk assessment, the allowances for the rates of relative sea level rise* [should be] *shown*[2]*"*

The changing climate should be viewed in relation to the project's design life;

> "*Category 1 – Temporary structures, not including structures or parts of structures that can be dismantled with a view to being re-used – 10 years*
>
> *Category 3 – Agricultural and similar buildings – 15 to 30 years*
>
> *Category 4 – Building structures and other common structures – 50 years*
>
> *Category 5 – Monumental building structures, bridges and other civil engineering structures – 100 years*[3]*"*

5.1 Sea Level Change

FCDPAG3 - Flood and Coastal Defence Appraisal Guidance gives guidance on the application of sea level changes to projects. Forecasted rises over the project's design life are in the order of 382 mm. These projected sea level changes are accounted for in modelled data. This site is not mapped as influenced by tidal flooding.

Table 4: Recommended contingency allowances for net sea level rises

	Net sea level rise (mm per year) relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, east midlands, London, south-east England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South-west England	3.5	8.0	11.5	14.5
North-west England, north-east England (north of Flamborough Head)	2.5	7.0	10.0	13.0

Figure 1 - Climate Change adaption for Sea Levels

5.2 Climatic Conditions

[2] TGPPG - 11
[3] BS EN 1990, Eurocode - Basis of structural design

Climate change allowance for design of surface water drainage are sourced from the Environment Agency[4]. These climatic conditions have been taken in to account in Surface Water Management features, such as attenuation tanks and SUDs. Attenuation feature scaling (where applicable) should reflect the upper end allowance (i.e. 40%), unless this can be shown to make the development unfeasable.

6.0 Flood Depths & Flood Zones

6.1 Strategic Flood Risk Assessment (SFRA)

The Hereford Strategic Flood Risk Assessment (SFRA) referred to in this report is that issued in 2008 and is made available for public access on the Hereford Council Website.

The SFRA includes Flood Maps based on assessment of fluvial flood risk. These maps illustrate the level of predicted flood risk both now and in the future, taking account of the likely impacts of climate change.

6.2 Flood Risk Maps

Maps in Appendix 2 are based on the Flood Zone classifications given in TGNPPF. The available maps indicate that the proposed development at Haywood Industrial Estate is within flood zone 1. Flood Zone 1 is defined in TGNPPF – Table 1.

"This zone comprises land assessed as having a 1 in 1000 or greater annual probability of river flooding (>0.1%), or a 1 in 1000 or greater annual probability of flooding from the sea (>0.1%) in any year."

As the site is at low risk of flood from river sand see it is thought that the focus of this FRA should be on surface water disposal:

7.0 Surface Water Management Plan

The proposed sees the creation of 6841m2 of impermeable surfaces. Measures to mitigate against the loss of these permeable surfacing are detailed below.

7.1 Attenuation Requirements

HR Wallingford Calculation shows that an attenuation volume of 188m3 is required. Calculations are included in **Appendix 3**.

7.2 Infiltration

There will be various drainage components to deal with surface water from differing areas.

7.2.1 Roof Water

Roof Water will be fed to a rain water harvesting tank (or series of tanks) with a capacity of 30,000 litres (30m3). This will make full use of west season roof water.

7.2.2 Yard Water

[4] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

In accordance with the SUDs manual a solution must be offered that meets water quality requirements for a medium hazard activity. Surface water from yard will drain to a bio retention system as marked on project drawings. The bio retention system which is essence a planted swale will have a storage capacity of 158m^3. Bio-Retention Area will be 464m2 and will have mean cross section depth of 0.3m below lowest input level.

8.0 The Sequential Test

Not applicable. The development is an extension of the existing use, and as such could not be implemented elsewhere.

9.0 Exceptions Test

The development represents a "*more vulnerable*" development situated in Flood Zone 3 and as such **is not** subject to the exceptions test. See Figure 3.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Figure 2 - Exception Test Required?

10.0 Building Design

No special requirements, design o meet attenuation requirements as per 7.0

11.0 Counter Comments

The comments provided by Balfour Beatty. Counter comments are in blue text **Appendix 4.**

12.0 Conclusions

Adhering to the suggestions contained herein, the development is acceptable within the context of the current regulatory framework.

13.0 Certification

For the avoidance of doubt, the parties hereby expressly agree that the Consultant takes no liability for and gives not warranty against actual flooding of The Client's property or damages material or personal in relation to the performance of the service.

Guidance given on building flood resistance / resilience is given as example only. Responsibility for building design / services and resulting levels of resistance, resilience or drainage performance rests with the client and or developer.

This planning report is produced for the sole use of the Client, and no responsibility of any kind, whether for negligence or otherwise, can be accepted for any Third Party who may rely upon it.

The conclusions and recommendations given in this planning report are based on our understanding of the future plans for the site. Drainage detail given for guidance only, no responsibility taken with regards to functionality of the system.

The scope of this FRA was discussed and agreed with the Client. No responsibility is accepted for conditions not encountered, which are outside of the agreed scope of work.

Prepared by:

[redacted]

William James Thorpe BSc PGD FGS MIAIA

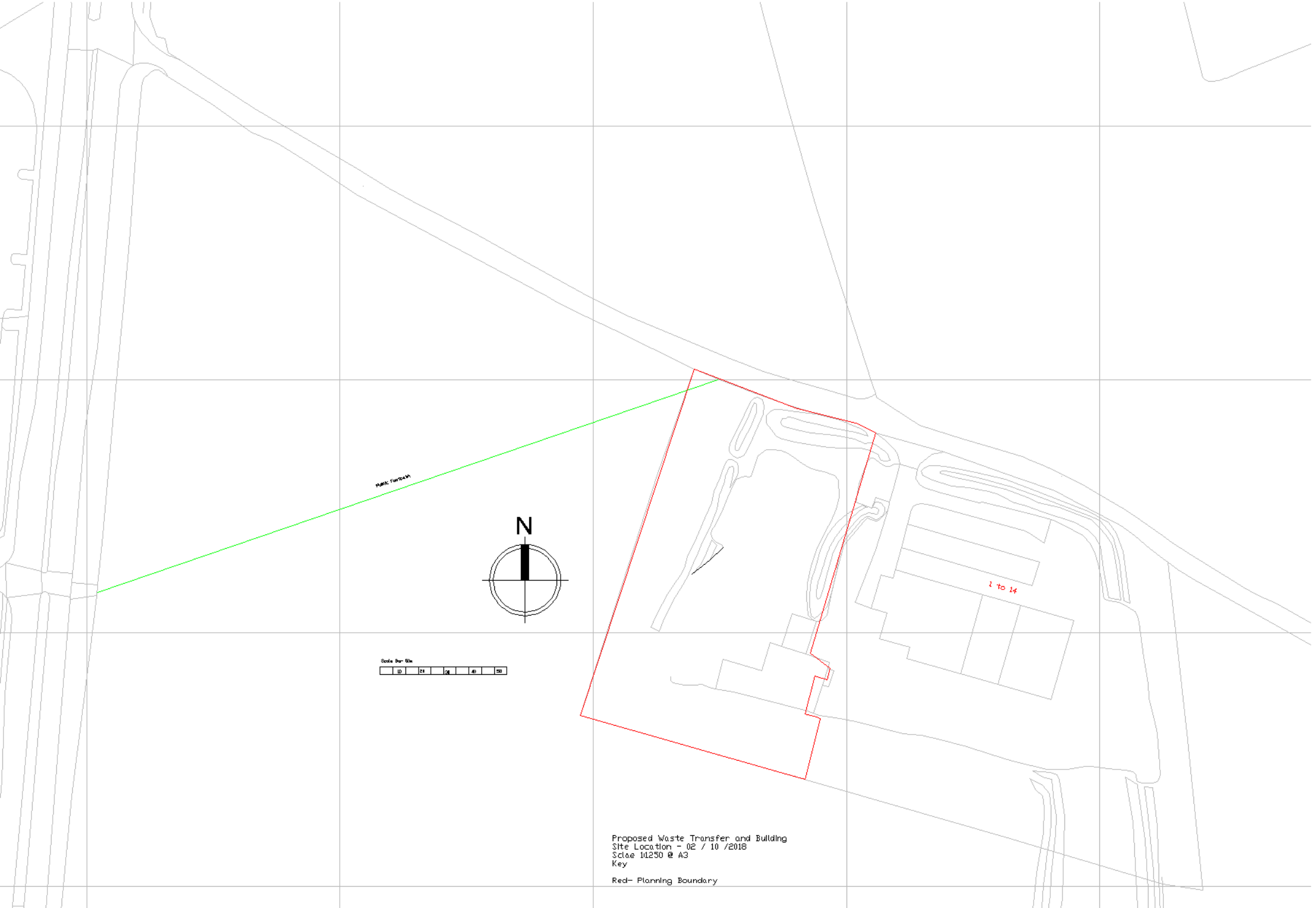
Managing Director

Flood Risk Consultants

Flood Risk Report

Appendix 1

Site Location



Proposed Waste Transfer and Building
Site Location - 02 / 10 /2018
Scale 1:1250 @ A3
Key

Red- Planning Boundary

Appendix 2

Flood Data

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
HCD Limited	**350363/248416**	**25 Jul 2018 1:01**

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Environment Agency

Flood map for planning

Your reference
HCD Limited

Location (easting/northing)
350363/248416

Scale
1:2500

Created
25 Jul 2018 1:01

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix 3

Attenuation Calculations

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Will Thorpe
Site name:	HCD
Site location:	Haywood Ind. Est.

Site coordinates

Latitude:	52.13178° N
Longitude:	2.72675° W

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the drainage scheme.

Reference:	6407174
Date:	2018-07-25T14:20:07

Methodology	IH124

Site characteristics

Total site area (ha)	0.6841
Significant public open space (ha)	0
Area positively drained (ha)	0.6841
Pervious area contribution (%)	30
Impermeable area (ha)	0.6841
Percentage of drained area that is impermeable (%)	100
Impervious area drained via infiltration (ha)	0.3000
Return period for infiltration system design (year)	10
Impervious area drained to rainwater harvesting systems (ha)	0.3841
Return period for rainwater harvesting system design (year)	10
Compliance factor for rainwater harvesting system design (%)	66
Net site area for storage volume design (ha)	0.65
Net impermeable area for storage volume design (ha)	0.32

* Where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50 % of the 'area positively drained', the 'net site area' and the estimates of Qbar and other flow rates will have been reduced accordingly.

Design criteria

Volume control approach	Use long term storage

	Default	Edited
Climate change allowance factor	1.4	1.4
Urban creep allowance factor	1.1	1.1
Interception rainfall depth (mm)	5	5
Minimum flow rate (l/s)	5	5

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
Qbar total site area (l/s)	1.19	–
SOIL type	2	2
HOST class	N/A	N/A
SPR	0.3	0.3

Hydrology

	Default	Edited
SAAR (mm)	671	671
M5-60 Rainfall Depth (mm)	20	20
'r' Ratio M5-60/M5-2 day	0.4	0.4
Rainfall 100 yrs 6 hrs	63	
Rainfall 100 yrs 12 hrs	80.85	
FEH/FSR conversion factor	1.05	1.05
Hydrological region	9	
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 10 year	1.42	1.42
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Site discharge rates

	Default	Edited
Qbar total site area (l/s)	1.19	1.19
Qbar net site area (l/s)	1.12	1.12
1 in 1 year (l/s)	5	5
1 in 30 years (l/s)	5	5
1 in 100 years (l/s)	5	5

Estimated storage volumes

	Default	Edited
Interception storage (m^3)	0	0
Attenuation storage (m^3)	188	188
Long term storage (m^3)	0	0
Treatment storage (m^3)	0	0
Total storage *(excluding treatment)* (m^3)	188	188

Appendix 4

Counter Comments

Information required	Reviewer comments	✓✖
Sources of risk		
Assessment of Flood Zone 2 and 3 taking the effects of climate change into account, including predicted flood depths for the 1 in 100 and 1 in 1000 annual probability events	The submitted FRA states that the site is located in Flood Zone 1, although review of the EA's Flood Map for Planning indicates the site is partially located in Flood Zones 2 and 3. The FRA has no assessment of Flood Zone 2 or 3 (including climate change effects) and no indication of flood depths. All working parts of site within Zone 1	✖
Assessment of areas protected by flood defences and risk of flooding in the event of breach, taking the effects of climate change into account	The FRA does not mention if the site is in an area protected by flood defences. No defences are present. Cleat from EA flood map as per Appendix 1	✖
Assessment of fluvial flood risk from other watercourses in close proximity (c.20m) to the site including those with no mapped flood extent, and taking the effects of climate change into account	The FRA has no assessment of fluvial flood risk from nearby watercourses, although our initial review of OS mapping indicates this risk is likely to be low. All working parts of site are Zone 1. Assume 1:1000 year risk level from fluvial.	✖
Assessment of mapped surface water flood risk	The FRA does not consider surface water flood risk although this is limited to small areas within the site boundary. Noted	✖
Assessment of flood risk associated with potential overland flow from adjacent steeply sloping land	The FRA does not consider overland flow, however, the topography surrounding the site is very flat, and so it is not expected to be at risk. Noted	✖
Assessment of groundwater flood risk	The FRA does not assess groundwater flood risk.	✖
Assessment of flooding from surface water, foul water and highway sewers	The FRA does not consider flooding from surface water, foul water or highway sewers. Very unlikely owing to limited infrastructure and small catchments.	✖
Assessment of flood risk from any other manmade sources, including reservoirs, ponds, detention basins etc.	The FRA does not consider flood risk from manmade sources, including the sand and gravel workings which are located in close proximity. None found during searches, hence no mention.	✖
Summary of historic flooding records and anecdotal evidence	No information is provided within the FRA. However our own review of historic flood records indicates that there are no known incidents in close proximity to the site.	✓
Other works that could pose risk		
Are there any other proposed works that could lead to increase flood risk to the site or elsewhere, for example culverting or diversion of watercourses?	No known works.	✓
Sequential approach		

Information required	Reviewer comments	✓✘
Assessment of the acceptability of the development within the identified Flood Zone, in accordance with the Sequential Test outlined in the NPPF	There is no indication as to the type of waste to be treated. FRA suggests the development will be classed as 'more vulnerable'. More vulnerable generally not considered appropriate in Flood Zone and will be subject to the exception test. Zone 1	✘
Demonstration of how a sequential approach has been taken to locate development in the lowest risk areas of the site, including the risk of flooding from other sources	Proposed building appears to be located in Flood Zone 2. Recommend consideration is given to applying a sequential approach (considering climate change effects) and locating the building in Flood Zone 1 within the site boundary. Zone 1	✘
Mitigation		
Summary of how the development has addressed the identified flood risks and incorporated appropriate mitigation into the layout and operation of the development	No risks identified or mitigation suggested within the FRA. Zone 1	✘
Assessment of how a safe access route(s) to Flood Zone 1 (not including dry islands) would be achieved from the development, taking flood hazard and climate change into account	Not assessed within the FRA but achievable by going west out of the site.	✓
Assessment of how the development will ensure no increased risk to people, property or infrastructure elsewhere, for example through the displacement of floodplain compensation or failure of flood defence structures, and demonstration of how mitigation will be incorporated into the design, with supporting calculations	The 1%+CC event is not considered within the FRA and there is no assessment of any mitigation that may be required 1:1000 risk.	✘
Exception Test		
Justification for the successful application of the Sequential Test, if applicable	The FRA does not demonstrate that the development can be adequately protected against identified flood risks nor does it demonstrate that it will not increase flood risk elsewhere. Zone 1	✘

Surface Water Management Strategy

A surface water management strategy should be submitted that includes the following information:

✓ Information provided is considered sufficient

✘ Information provided is not considered sufficient and further information will be required

Information required	Reviewer comments	✓✖
Strategy		
Summary of likely ground conditions including permeability and contamination risks	No information on likely ground conditions and contamination risks contained within the submitted FRA. Site Condition Report S14-130/SCR	✖
Confirmation of whether the site is located in a Source Protection Zone or Principal Aquifer	No information provided but the site is not located within a SPZ or Principal Aquifer.	✓
Summary and illustration of the proposed surface water drainage system including location of SuDS features, manholes, external pipework, attenuation features, pumping stations (if required) and discharge locations	No detailed information provided. Unclear what the proposed drainage strategy includes, and if it is proposed that all runoff is infiltrated to ground or partially discharged to a sewerage network / watercourse. Infiltration Submitted FRA discusses use of a bioretention swale to treat runoff from waste storage areas. Recommend EA consulted regarding suitability of treatment provision. In line with CIRIA	✖
Demonstration that the SuDS hierarchy has been considered in accordance with NPPF and justification for the proposed method of surface water discharge	No information provided. Unclear if it is proposed that all runoff is infiltrated to ground or partially discharged to a sewerage network / watercourse. Soak-Away = 1st Step in Hierarchy	✖
Demonstration that best practice SuDS have been promoted, appropriate to the size and nature of development	No information provided. As above. In line with CIRIA	✖
If pumped systems are proposed, justification for the use of these systems, summary of key design principles and assessment of residual risk, with supporting calculations	No mention of pumped systems and assumed these are not required. No pumped.	✓
Access, adoption and maintenance		
If access or works to third party land is required, details of these works and agreement in principal with necessary landowners/consenting authorities to cross third party land and/or make a connection to the proposed watercourse/sewer	No information provided as to whether or not the proposed drainage will have to cross third party land. No it will not.	✖
Confirmation of agreement in principle of proposed adoption and maintenance arrangements for the surface water drainage system	It is assumed the system will be maintained by the site owner / operator. Noted	✓
Demonstration that appropriate access is available to maintain SuDS features (including pumping stations)	No information provided. SUDs featured moved to make this easier.	✖