

Stewartby Waste Transfer Station

Technical Standards

FCC Waste Services (UK) Ltd

Report No. 14-K0157-ENV-R-00005

13 September 2022

Revision 01



BYRNELOOBY

IRELAND | UK | UAE | BAHRAIN | KSA

Document Control

Document: Technical Standards
 Project: Stewartby Waste Transfer Station
 Client: FCC Waste Services (UK) Ltd
 Report Number: 14-K0157-ENV-R-00005

Document Checking:

Revision	Revision/ Review Date	Details of Issue	Authorised		
			Prepared By	Checked By	Approved By
00	30 June 2022	Issued to Client	E Greenhalgh	P Roberts	P Roberts
01	13 September 2022	Issued to EA	E Greenhalgh	P Roberts	P Roberts

Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.

Contents

1	Introduction	1
1.1	Report Objectives	1
1.2	General Site Layout	1
1.3	Proposed Site Operations	2
1.4	General Management	2
2	Waste Pre-Acceptance, Acceptance and Tracking	3
2.1	Waste Acceptance Procedures	3
2.1.1	Level 1: Basic Characterisation	3
2.1.2	Level 2: Compliance Testing	5
2.1.3	Level 3: On-Site Verification	5
2.2	Rejection Procedure	5
2.3	Waste Tracking	6
3	Waste Storage	8
4	Waste Treatment	9
5	Emission Control	10
5.1	Enclosure within buildings	10
5.2	Point source emissions to air (channelled emissions)	10
5.3	Fugitive emissions to air	10
5.3.1	Dust, mud and litter	10
5.3.2	Noise and Vibration	11
5.4	Point source emissions to water (including sewer)	12
5.5	Fugitive emissions to land and water	12
5.6	Pests	12
6	Emissions monitoring and limits	13
	Appendix A – Drawings	A
	Appendix B – Noise Assessment	B
	Appendix C – Flood Risk Assessment	C

1 Introduction

1.1 Report Objectives

This Technical Standards has been prepared by ByrneLooby Partners (UK) Limited to support a permit application by FCC Waste Services (UK) Ltd (the proposed Operator) for a Waste Transfer Station (WTS) at Stewartby, Bedford (the Site). A planning application is being submitted simultaneously for the development (reference: 22/01285/EIAWM).

The Site is located 500 m north of Stewartby village and is at approximate National Grid Reference (NGR) TL 01694 43157. The site has historically been used as railway sidings and the eastern area of the site for clay extraction for nearby brickworks. The existing railway infrastructure will be retained and continue to be used for the import by rail of non-hazardous excavation, construction and demolition waste, for onward transfer via road in Heavy Goods Vehicles (HGVs) to separately permitted waste activities. To the north of the site is Stewartby Landfill (permit reference BV4576IK) with associated Leachate Treatment Plant to the south (permit reference BV0953IM). The Site is accessed from Green Lane via the existing access road towards the western end of the site.

An Environmental Risk Assessment (ERA) (14-K0157-ENV-R-00003), Dust Management Plan (DMP) (14-K0157-ENV-R-00004) and Site Condition Report (SCR) (14-K0157-ENV-R-00002) have been submitted with this application. Reference has been made to these documents and the following Environment Agency (Agency) guidance:

- [Non-hazardous and inert waste: appropriate measures for permitted facilities - Guidance - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/non-hazardous-and-inert-waste-appropriate-measures-for-permitted-facilities)

1.2 General Site Layout

The permit boundary for the Site is shown on drawing referenced K0157/1/001. The Site Layout is shown on drawing referenced: K0157/1/002.

The Site will operate as a WTS for the import of non-hazardous excavation, construction and demolition waste with an inherently low biodegradable and contamination potential. The waste will be imported via train and transferred to HGVs for onward off-site transfer for recovery or disposal elsewhere. The Site benefits from three existing sidings, an offload area and internal site access roads. In order to optimise the operations of the Site, the Operator proposes to install a replacement weighbridge and weighbridge office at the entrance to the Site and a wheel wash to the north of the Sidings.

The Noise Assessment (Appendix B) undertaken in support of the planning application identified the need for an acoustic barrier along the southern boundary of the Site to mitigate the effects of noise on future residential properties within the derelict brickworks.

1.3 Proposed Site Operations

Trains containing the waste for onward transfer will pull into the sidings for Lines 1 and 2. Line 3 will not be used for offloading and would only be used to hold the trains and HGVs temporarily in the event that Lines 1 and 2 are occupied.

The material will be removed from the train carriages using a mobile grab, the operator of which will be positioned to give a clear view of the inside of the carriage in the awaiting HGV. Under normal operating conditions the waste will be transferred directly into the HGVs. The grab and awaiting HGVs will progress gradually along the length of the stationary train until it had been emptied.

Stockpiling of material would not typically be required, however an area of impermeable surfacing with sealed drainage has been designated to allow for temporary stockpiling of material in the unlikely event there are no HGVs available to directly receive the waste. This material will be excavated from the storage area as soon as practicably possible. Any spillages of dry soil or waste material during the transfer process between train and HGV will be removed as soon as practicably possible.

HGVs will access the Site off Green Lane to the south of the Site. They will weigh in at the site weighbridge before using the internal site access road to access the Sidings. HGVs will then be loaded as described above. Once full, the HGVs will be sheeted and travel around the Sidings, passing through a wheel wash and weighing off on the weighbridge before exiting onto Green Lane.

No treatment activities are proposed within the permitted boundary.

1.4 General Management

The Operator has an Environmental Management System (EMS) certified to ISO14001. The Operator also has a Competence Management System (CMS) certified by Lloyd's Register. Both certificates are attached to the Permit Application Report (referenced: 14-K0157-ENV-R-00001). These systems incorporate the relevant parts of the Agency Guidance, Section 2 general management appropriate measures. The remaining sections are discussed in this Technical Standards as necessary.

2 Waste Pre-Acceptance, Acceptance and Tracking

2.1 Waste Acceptance Procedures

The waste accepted at the Site will be held in carriages or the body of the waiting HGV, or in exceptional circumstances it may be placed temporarily on the storage pad. The Operator's visibility of the material will therefore be limited to a restricted view during transfer between carriage and HGV, or temporary placement on the storage pad. The material will not be visible whilst it is being held in the carriages awaiting offloading or when outgoing loads are registered at the weighbridge. Reliance on confirming the acceptability of the material will therefore be placed on comprehensive information provided by the operator of the source rail-hub site with limited visual checks carried out by the grab operator when possible.

Waste acceptance will follow a structured hierarchy with appropriate points of control for the identification and validation of suitable wastes. The waste acceptance procedures will be an integral part of the Site's EMS and can be summarised as follows:

Level 1: Basic characterisation through pre-submission of an appropriate waste classification (European Waste Catalogue (EWC) codes, site investigations etc);

Level 2: Compliance testing; and

Level 3: On-site verification through retrospective review of material transferred at site.

2.1.1 Level 1: Basic Characterisation

The proposed waste types are listed in Table 1 of the Permit Application Report (referenced: 14-K0157-ENV-R-00001) and are based on Standard Rules (SR) 2009 No 5: inert and excavation waste transfer station below 250kte. These waste types consist of non-hazardous excavation, construction and demolition wastes along with similar materials which have undergone mechanical treatment (coded as EWC code 19 12 12).

Details of the waste will be provided in advance to the Operator of the WTS. The EWC code of wastes provided will be checked against any relevant available information provided directly to the Operator from the supplier e.g. waste description and source of waste to confirm the waste coding is correct, it can be accepted under the permit and it is suitable for transfer at Site. The waste enquiry procedure requires the following information to be gathered prior to waste acceptance:

- Details of the waste producer including their organisation name, address and contact details;
- A description of the waste;
- The waste classification code (EWC code);

- The source of the waste (the producer's business and the specific process that has created the waste);
- Information on the nature and variability of the waste production process;
- Information about the history of the producer site if it may be relevant to the classification of the waste (for example soils and other construction and demolition arisings from a site contaminated by previous industrial uses);
- Evidence the waste is free from contamination;
- Appearance of the waste (e.g. smell, colour, physical form);
- The waste's composition (based on representative samples if necessary)
- A description of the waste's odour and whether it is likely to be odorous; and,
- An estimate of the quantity you expect to receive in each load and in a year.

Agency guidance includes a list of wastes that are assumed to be inert and therefore acceptable without testing if they:

- come from a single source;
- are well characterised and described;
- carry no risk of contamination, for example from a site that has not previously been developed; and,
- are listed waste codes that do not need analysis (provided in Agency guidance), which includes EWC codes proposed for WTS.

In the case of suspicion of contamination from visual inspection the waste will be tested or in extreme cases where contamination is very evident refused acceptance on site. If waste acceptance testing is required, the appropriate data will be requested and will be reviewed. Analysis of samples will be carried out by laboratories who are UKAS or MCERTs accredited for the prescribed test.

For mirror entry codes, evidence will be retained from the supplier to show an assessment of the waste was undertaken to assign the relevant mirror entry code. If the waste is a mirror entry and has not been properly assessed, it will be assumed to be the hazardous entry as a precautionary measure and acceptance at the site refused in advance.

Pre-acceptance records must be kept at least 3 years. If an enquiry does not lead to receipt of the waste, records do not need to be kept.

Pre-acceptance information will be reassessed if the waste changes, the processes giving rise to the waste changes (as advised by the supplier) or the waste received does not conform to the pre-acceptance information. In all cases the pre-acceptance information will be reassessed on an annual basis as a minimum.

2.1.2 Level 2: Compliance Testing

This level of verification will be carried out with due regard for those waste characteristics identified at the Level 1 Basic Characterisation. It is carried out on regularly occurring waste streams to ensure that they are unchanged and continue to comply with the results of the basic characterisation, the acceptance criteria for the site, and its permit requirements.

2.1.3 Level 3: On-Site Verification

All incoming waste will enter the site via train. The documentation accompanying the load will have been sent in advance will be checked and will include, but not be limited to, the Carriers Certificate of Registration (this will be held by the Operator at site for their own vehicles) and Duty of Care Waste Transfer Note. The information to be recorded in respect of each load will be:

- Waste Type & EWC Code;
- Date;
- Time;
- Customer Name;
- Vehicle Registration Number and Type;
- Ticket Number; and,
- Carriers Certificate of Registration.

Each load arriving at the site will be subject to a Level 3 Verification. This constitutes, where possible, a visual inspection by site personnel prior to transfer of the waste. Each load of waste will be weighed on departure to confirm the quantities against the accompanying paperwork. The weight will be recorded electronically. Personnel carrying out waste acceptance checks will be appropriately trained in accordance with the Site's EMS / CMS.

To prevent any potentially polluting liquids from escaping the offloading area consists of a concrete pad with sealed drainage.

2.2 Rejection Procedure

Loads which are identified by the grab operator to be potentially unsuitable after arriving at Site will be referred to the site manager for action. This could include rejection of further loads from the source, isolation and removal of the waste materials and restrictions on future waste inputs from the producer. In the event that any load or part load is found prior to its transfer to be outside those permitted at the site it will be rejected from the site. Any such waste will be loaded back onto the train.

In each instance, the Technically Competent Manager or nominated deputy will issue a Load Rejection Form to the waste producer or carrier.

In such circumstances where a waste load is rejected, the Agency will be notified and a record kept of the:

- nature and quantity of waste load;
- name and address of waste producer / waste carrier;
- waste carrier registration number;
- vehicle registration number; and
- date and time of load rejection.

All rejected loads will be accompanied by the correct documentation.

2.3 Waste Tracking

The Site has an electronic tracking system which holds the information generated during:

- pre-acceptance
- acceptance
- non-conformance or rejection
- storage
- removal off site

This information is readily accessible.

Records will also be kept and updated for deliveries and despatches. The tracking system will also operate as a waste inventory. It will include the following information:

- the date the waste arrived on site
- the original producer's details (or unique identifier)
- a unique reference number
- waste pre-acceptance and acceptance information
- a physical description of the material
- the intended recovery or disposal route
- the nature and quantity of wastes being transferred via the site

- from which train and which siding the waste was removed from and whether it was subject to temporary storage before being loaded into a HGV
- where the waste is in the designated recovery or disposal process
- identifying the staff who have taken any decisions about accepting or rejecting waste streams
- details that link waste to relevant transfer notes
- details of any non-conformances and rejections, including consignment notes for waste rejected because it is hazardous

The electronic system must be able to report for each of EWC code:

- the total quantity of waste present on site at any one time
- a breakdown of the waste quantities stored pending onward transfer
- where a batch of waste is located based on a site plan
- the quantity of waste on site compared with the limits in your management system and permit
- the length of time the waste has been on site compared with the limits in your management system and permit

The electronic system will also be able to report the total quantity of end-of-waste materials on site at any one time, and where that material is located based on the site plan.

Copy of records will be backed-up off site. These records will be readily accessible in an emergency.

Acceptance records will be kept for a minimum of 3 years after the waste has been removed off site. Records may be kept for longer if they are required for other purposes.

3 Waste Storage

Storage of material would not typically be required. However, in the unlikely event that materials cannot be transferred immediately to the HGVs the offloading area may be used for temporary storage. The offloading area consists of a concrete pad with sealed drainage and is shown on drawing referenced K0157/1/002 Site Layout Plan. Surfaces and drainage will be regularly inspected in accordance with the Site's EMS to ensure there is no loss of containment. Any issues associated with spillage of material or contaminating liquids will be dealt with as soon as practicably possible.

Existing site security and the proposed additional fencing will prevent unauthorised access and vandalism. Vehicles will be kept overnight in a secure area with appropriate security measures.

Waste will be stored and handled in a way that makes sure pollution risks are prevented and minimised by the measures in place onsite. Waste handling will be carried out by competent staff using appropriate equipment in accordance with the Site's EMS /CMS. Mechanical unloading technologies will be used where possible, safe and practical to do so.

Good housekeeping practices will be implemented to make sure the site is clear of dust, mud, and other debris. Any spillages of waste will be cleaned up.

4 Waste Treatment

There are no treatment activities proposed for the site as part of this application.

5 Emission Control

5.1 Enclosure within buildings

Agency Guidance accepts that if non-treatment activities are not likely to cause (or are not causing) significant pollution at sensitive receptors and can be addressed by alternative measures then they do not need to be carried out within a building.

The ERA and DMP submitted with this application demonstrate that there will appropriate measures in place to manage potential emissions (e.g. dust, mud and noise) therefore the non-treatment activities do not need to be carried out in a building. In addition, it would not be practical or financially feasible for the railway sidings and offloading area (~5,288 m³) to be contained within a building. The construction of a building around the activity would be of limited benefit as other appropriate measures will be sufficient to minimise any potentially polluting emissions.

5.2 Point source emissions to air (channelled emissions)

There will be no point source emissions to air.

5.3 Fugitive emissions to air

An ERA has been submitted with this application to assess the potential risks associated with the proposed activity. The ERA concluded that with the use of appropriate mitigating controls where necessary, the activity does not present a significant risk to surrounding receptors.

5.3.1 Dust, mud and litter

Waste acceptance procedures will restrict the waste types to be brought to site. The proposed wastes are very unlikely to contain materials which could present a risk of wind-blown litter and have not been considered further in the ERA.

There is potential for dust emissions to arise during the deposit and transfer of potentially dry or dusty wastes, and vehicle movements on unpaved or dusty roads. Fugitive dust may present a dust nuisance to surrounding human receptors or cause an adverse impact if excessive deposits land on sensitive habitats and smother sensitive plant life or surface water receptors as accumulated sediment. Mud accumulated from unpaved roads or from the WTS may also be trailed onto the highway by vehicles leaving the site. A DMP has been submitted with this application and includes the controls for dust and mud. A summary has been provided below for reference:

- All vehicles leaving site will use the proposed wheel wash to remove excess mud or debris which may dry and give rise to dust and debris on public highways. The wheel

wash will be subject to regular inspections and maintenance to ensure appropriate functionality;

- Internal roads are regularly maintained and may readily be cleaned with a bowser or road sweeper;
- A site speed limit is set to prevent excessive disturbance of dust;
- All vehicles transporting materials to and from Site will be sheeted;
- Drop heights of materials will be minimised;
- The dust assessment provided for the planning describes that additional trees planting may be provided on the site boundary and will act as a barrier to dust;
- All site personnel will be trained to identify the potential sources of dust and the effective mitigation measures to reduce its impact;
- Good housekeeping practices will be implemented to make sure the site is clear of dust, mud, and other debris;
- Regular visual inspections will be conducted of the operation by the site personnel, as deemed necessary and especially during windy conditions to ensure that any dust sources are identified and dealt with promptly; and,
- The operator will ensure appropriate controls are in place during windy or dry conditions to prevent dust or particulates spreading beyond the site boundary, comprising the watering of vehicle circulation areas and spraying material with low moisture content with water prior to handling. Options also include restricting or suspending activities most likely to generate dust.

5.3.2 Noise and Vibration

There is a potential for noise and vibration to be generated from the WTS. This will be generated primarily by the movement and operations of Site plant and railway carriages, and by the loading and unloading of waste during operational hours. A Noise Assessment has been submitted with the planning application and is attached as Appendix B. The Noise Assessment and ERA contain the controls for noise and vibration.

- Plant will be checked at the recommended service intervals and maintained in accordance with the manufacturer's instructions;
- Plant and vehicles will be switched off when not in use;
- Site roads will be maintained with smooth pot hole-free surfaces, and subject to an onsite speed limit;
- Drop heights of materials will be minimised;

- Site personnel will be instructed to carry out all routine operations in a manner that does not cause unnecessary levels of noise;
- Planning will restrict site operational hours; and,
- An acoustic barrier will be constructed along the southern boundary of the Site should residential properties be constructed at the derelict brickworks.

5.4 Point source emissions to water (including sewer)

There will be no point source emissions of potentially contaminated liquids to water.

5.5 Fugitive emissions to land and water

The offloading area will consist of a concrete pad with sealed drainage which will collect in a sump and will either be tankered off-site or treated at the adjacent Leachate Treatment Plant.

A Flood Risk Assessment (FRA) has been submitted with the planning application and is attached as Appendix C. It identified and assessed the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

The only proposed alterations to the development are for the construction of a weighbridge, wheelwash and temporary storage pad with sealed drainage. It is understood that the drainage infrastructure at the Site efficiently and effectively manages surface water runoff generated at the site. As there is no history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed Site use. The area of impermeable surfacing will not change. The surface water runoff will not increase post-application compared to pre-application and there will be no increase in surface water flood risk to the site and off-site locations.

The FRA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the National Planning Policy Framework.

5.6 Pests

Putrescible waste may attract pests and scavengers and also provide a habitat for the breeding or loading of pests and vermin. As the materials to be accepted are unlikely to contain anything to attract pests or vermin, the risk associated with the Site is considered to be negligible and have not been considered further in the ERA.

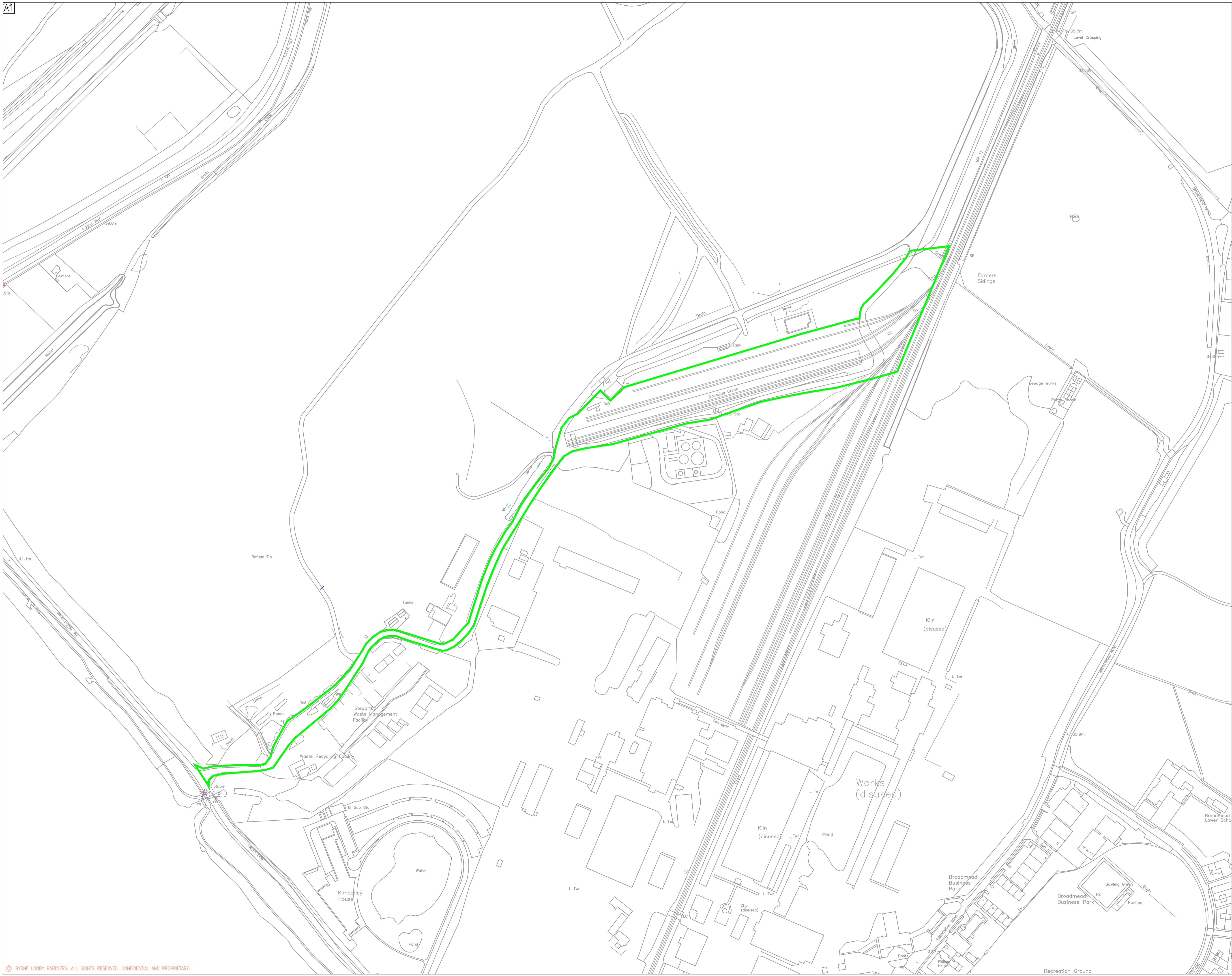
6 Emissions monitoring and limits

There are no monitoring requirements for the Site.

Appendix A – Drawings

- NOTES:
1. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
 2. DO NOT SCALE FROM THIS DRAWING.
 3. ANY ANOMALIES IDENTIFIED WITH THE DETAILS SHOWN ON THIS DRAWING ARE TO BE BROUGHT TO THE ATTENTION OF BYRNE LOOBY PRIOR TO CONSTRUCTION WORKS COMMENCING.

LEGEND:
—— PERMIT BOUNDARY



Rev	Date	Description	By	Chk	App

BYRNE LOOBY
 WWW.BYRNELOOBY.COM
 IRELAND | UK | UAE | BAHRAIN | KSA

CLIENT
 FCC

PROJECT
 STEWARTBY

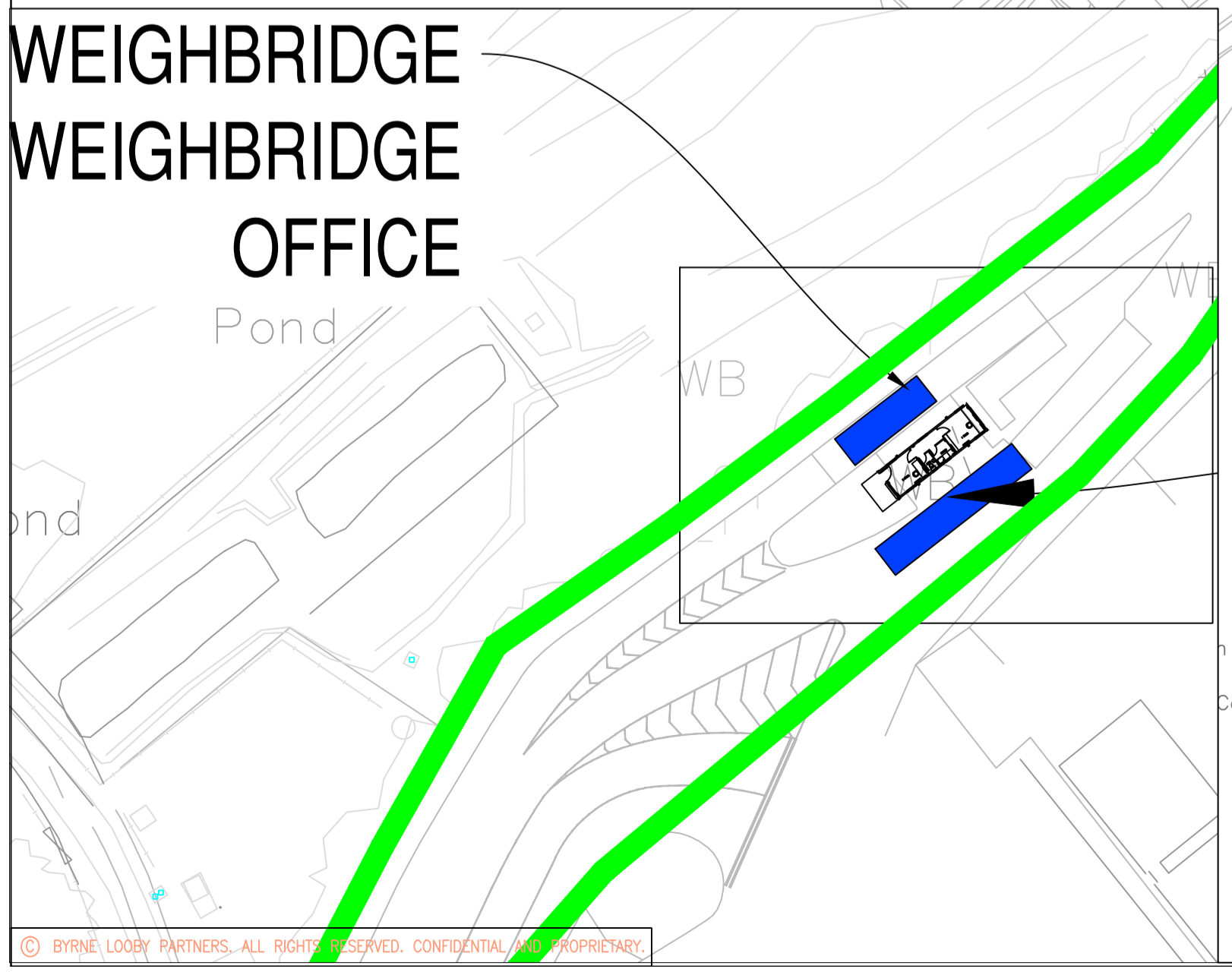
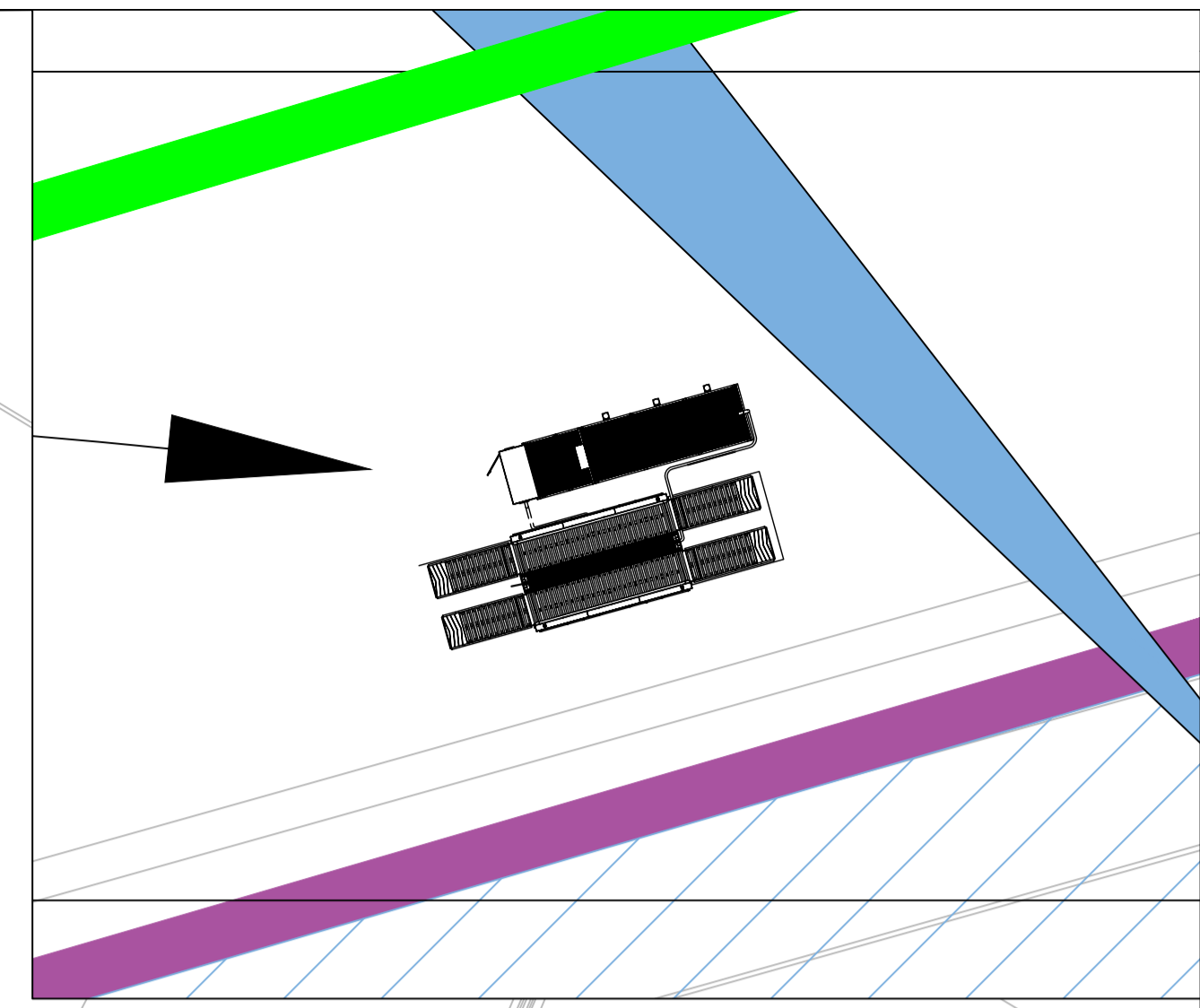
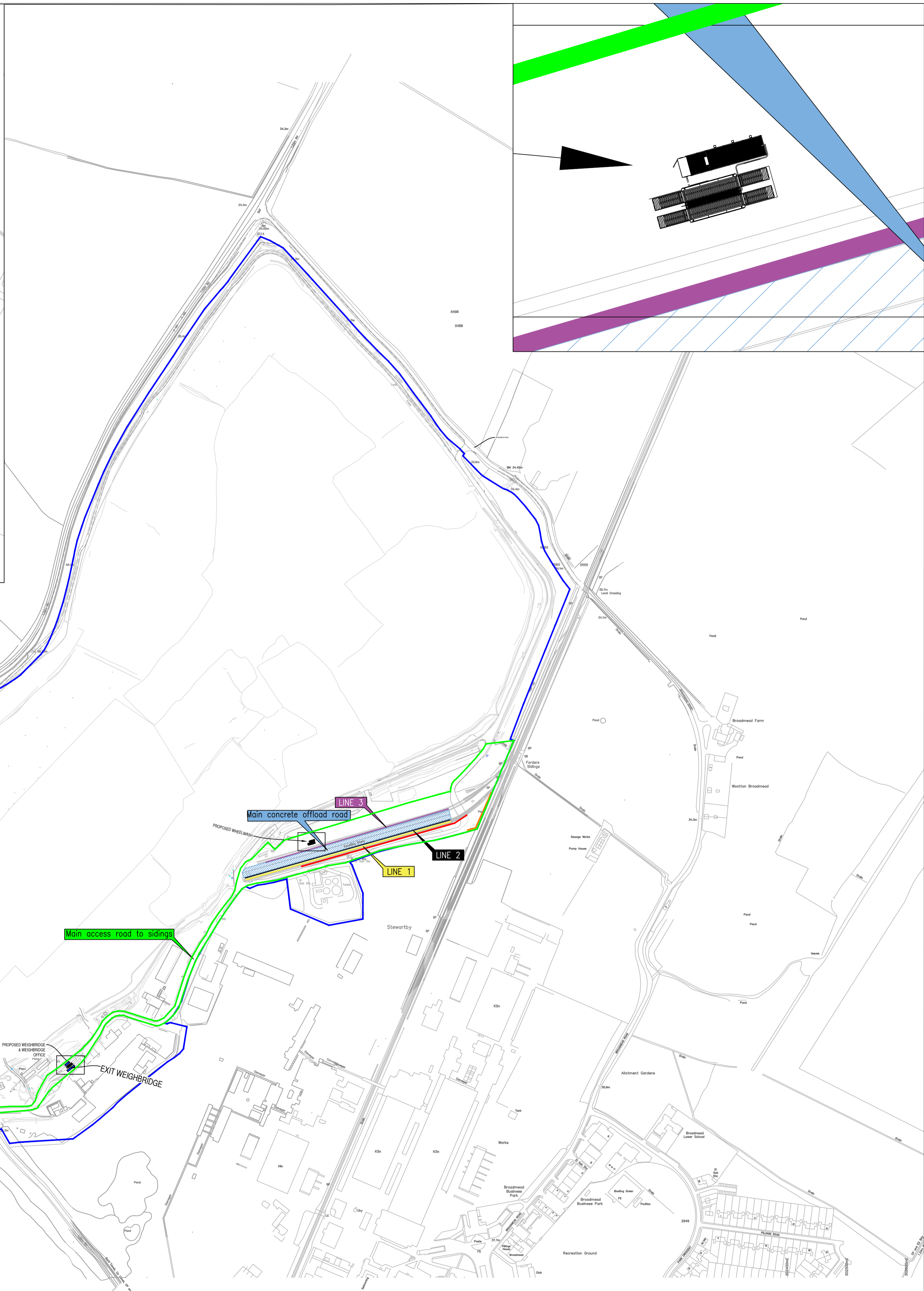
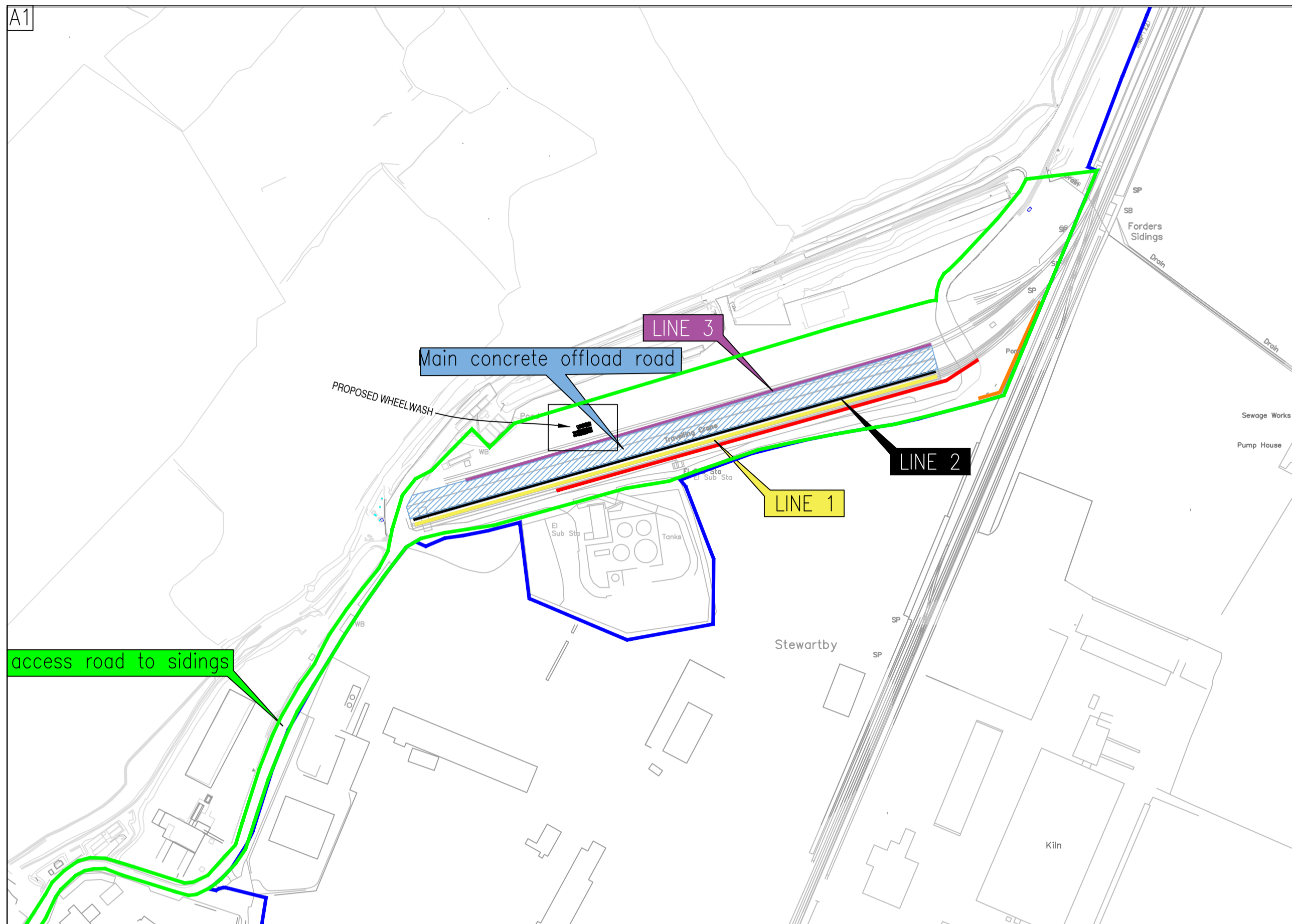
DRAWING TITLE
 WTS PERMIT BOUNDARY

STATUS
 FINAL

Date: 23.06.22	Scale: 1:2000	Drawn: JM	Check: MR	App: JB
Project No: K0157	Dwg. No: K0157.1.001	Rev: 00		

- NOTES:
1. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS IN METRES ABOVE ORDINANCE DATUM.
 2. DO NOT SCALE FROM THIS DRAWING.
 3. ANY ANOMALIES IDENTIFIED WITH THE DETAILS SHOWN ON THIS DRAWING ARE TO BE BROUGHT TO THE ATTENTION OF BYRNE LOOBY PRIOR TO CONSTRUCTION WORKS COMMENCING.

- LEGEND:
- PERMIT BOUNDARY
 - OWNERSHIP BOUNDARY
 - 6M HIGH ACOUSTIC FENCE
 - 4M HIGH ACOUSTIC FENCE?
 - PROPOSED FENCING UP TO 2M IN HEIGHT
 - MAIN CONCRETE OFFLOAD AREA



Rev	Date	Description	By	Chk	App
BYRNE LOOBY WWW.BYRNELOOBY.COM					
IRELAND UK UAE BAHRAIN KSA					
CLIENT FCC					
PROJECT STEWARTBY					
DRAWING TITLE WTS SITE LAYOUT PLAN					
STATUS FINAL					
Date	23.06.22	Scale	1:2000	Drawn	JM
Project No.	K0157	Dwg. No.	K0157.2.002	Chk	MR
				App	JB
				Rev	00

Appendix B – Noise Assessment

CHAPTER 5.0 NOISE & VIBRATION

5.0	NOISE & VIBRATION	5-1
5.1	Introduction.....	5-1
5.2	Proposed Development	5-3
5.3	Methodology and Scope of Assessment.....	5-3
5.4	Baseline.....	5-19
5.5	Assessment of Effects	5-21
5.6	Cumulative Effects.....	5-28
5.7	Additional Mitigation.....	5-30
5.8	Residual Effects and Conclusions.....	5-31

FIGURES

Figure 5.1.....	Nearest Residential Noise Receptors
Figure 5.2.....	Rail Sidings Acoustic Screen Location

APPENDICES

Appendix 5-1	Basic Acoustic and Vibration Terminology
Appendix 5-2	Baseline Survey Details
Appendix 5-3.....	August 2019 Baseline Survey Results
Appendix 5-4.....	Noise Model Settings & Mapping Results
Appendix 5-5.....	Rail Sidings Noise Levels
Appendix 5-6.....	Vibration Technical Terms
Appendix 5-7.....	Examples of Vibration Monitoring

5.0 NOISE & VIBRATION

5.1 Introduction

5.1.1 This chapter assesses the impact of the Proposed Development with regard to noise. It describes the methods used to assess the impacts, the baseline conditions at the Site and the potentially affected noise sensitive receptors, the possible direct and indirect impacts arising from the Proposed Development and the mitigation measures that could be implemented to reduce noise impact from the proposal.

5.1.2 The assessment includes:

- description of the existing sound environment;
- outline of the likely evolution of the future baseline sound levels;
- identification of those aspects of the Proposed Development that may cause noise effects;
- predictions of noise levels during the operation phase upon the nearest Noise Sensitive Receptors (NSRs);
- details of potential cumulative effects where noise from other potential developments may also affect the same NSRs; and
- likely residual significant effects taking account of proposed mitigation.

5.1.3 Potential noise effects are considered in the context of the predicted background sound levels at NSRs, which at this location are likely to be influenced by road and rail traffic.

5.1.4 Appendix 5-1 provides details of technical terms used within the chapter. There is also a chart showing typical everyday noise levels to assist in understanding the subjective level of noise in terms of decibels (dB).

Proposed Development

5.1.5 A full description of the Proposed Development is provided in Chapter 3.

5.1.6 The Proposed Development is located adjacent to the landfilled area, close to its eastern boundary with the former brickworks.

5.1.7 Access to the Sidings is off Green Lane. This connects to the C94 at a T junction some 600m to the northwest of the landfill site entrance. The C94 then provides connection to the upgraded A421.

5.1.8 The Rail Sidings would allow trains to arrive and depart 24 hours per day and 7 days per week. The offloading of trains would be limited to the following:

- Monday to Friday: 0700 to 1830 hours
- Saturday: 0700 to 1700 hours

5.1.9 A baseline noise survey was originally carried out in August 2019 for the noise impact assessment undertaken for the Leachate Treatment Facility (LTP) in the vicinity of future NSRs at the brickworks site to determine background and residual sound levels. The aim of the sound survey was to:

- identify the existing baseline sound levels for use as a reference for background and residual sound levels in the assessment of impacts related to the operation of the Proposed Development;
- enable the assessment baseline to be established and understand the effects of permitted developments on the future baseline; and
- characterise the nearest NSRs or noise sensitive sites.

5.1.10 The methodology and approach to the sound survey and assessment included the following:

- establishing the NSRs;
- evaluation of present and assessment of representative background and ambient sound levels;
- evaluation of noise levels from the Proposed Development in terms of the use of the rail sidings;
- assessment of specific noise sources in relation to appropriate guidance and standards (e.g. PPG¹, BS4142:2014+A1:2019², BS8233: 2014³ and DMRB LA111⁴); and
- identification of any additional noise control necessary (beyond the incorporated mitigation measures) where Site generated noise has been identified as exceeding noise limits or would have the potential to cause a significant increase in noise levels for the assessment baseline.

¹ Ministry of Housing, Communities & Local Government: *National Planning Practice Guidance (June 2021) – Noise (July 2019) & Minerals (October 2014)*.

² BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.

³ BS 8233: 2014 'Guidance on sound insulation and noise reduction in buildings'.

⁴ *Highways England Design Manual for Roads and Bridges (May 2020) LA 111 Noise and vibration (Rev 2)*.

Competence

5.1.11 The author of this assessment has over 35 years' experience in the field of industrial and environmental acoustics with a Masters Degree in Acoustics and is a Member of the Institute of Acoustics, Member of the Association of Noise Consultants, Member of the Academy of Experts and an Incorporated Engineer.

5.2 Proposed Development

5.2.1 This ES has been prepared on behalf of FCC Environment (hereafter FCC) in respect of the Proposed Development for the use of the Stewartby Rail Sidings.

5.3 Methodology and Scope of Assessment

Legislation and Guidance

General

5.3.1 To establish the impact of the Proposed Development in respect of noise on existing or proposed residential receptors it is necessary to consider the relevant noise guidance, standards and policy for an industrial development. The following section examines the guidance and establishes the methodology to be adopted for assessing noise impacts.

5.3.2 Information used in this assessment has been obtained from the following sources:

- Ordnance Survey maps of the local area;
- general layout of the Proposed Development;
- National Planning Policy Framework⁵ – July 2021;
- Noise Policy Statement for England (NPSE)⁶ – March 2010;
- Planning Practice Guidance – June 2021;
- BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound';
- BS 5228 Parts 1 & 2:2009+A1:2014⁷ 'Code of Practice for noise and vibration control on construction and open sites';
- BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings';

⁵ Ministry of Housing, Communities & Local Government: National Planning Policy Framework (July 2021).

⁶ Department for Environment, Food & Rural Affairs (March 2010): Noise Policy Statement for England.

⁷ BS 5228-2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites' – Part 1: Noise & Part 2: Vibration

- Environment Agency – Guidance Noise and vibration management : environmental permits⁸ - July 2021;
- ProPG Planning and Noise – Professional Practice Guidance on Planning and Noise: New Residential Development⁹ - May 2017;
- World Health Organisation: ‘Guidelines for Community Noise’¹⁰ - April 1999;
- World Health Organisation ‘Night Noise Guidelines for Europe’¹¹ – 2009;
- Department of Transport ‘Calculation of Road Traffic Noise’¹²: 1988;
- Design Manual for Roads and Bridges, LA 111 ‘Noise and Vibration’ May 2020;
- ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors¹³;
- British Standards BS 6472-1:2008¹⁴ and BS 7385:1993, Part 2¹⁵;
- Buron Happold ES Addendum Noise Chapter 6 Noise and Vibration: October 2019;
- Buro Happold Report for Stewartby Brickworks Indsutrail Noise Sources Noise Impact Assessment (report ref: 004161 rev 01 dated 7 December 2020); and
- Bedford Borough Council Planning permission 18/03022/EIA dated 29th October 2021 for Former Stewartby Brickworks mixed use redevelopment.

General Planning Policy and Guidance

5.3.3 The following section outlines the general planning policy and guidance that relates to the assessment of residential amenity and protection of residents from general environmental and industrial noise and specific guidance on impacts relating to changes in road traffic noise.

National Planning Policy Framework: July 2021⁵ (NPPF)

5.3.4 Chapter 15 of the National Planning Policy Framework (NPPF) relates to ‘Conserving and enhancing the natural environment’.

⁸ Environment Agency – Guidance: Noise and vibration management: environmental permits.

⁹ Association of Noise Consultants, CIEH & Institute of Acoustics, ProPG: Planning & Noise (May 2017)– New Residential Development.

¹⁰ World Health Organisation (WHO): ‘Guidelines for Community Noise’ (1999).

¹¹ World Health Organisation (WHO): ‘Night Noise Guidelines for Europe’ (2009).

¹² Department of Transport (Welsh Office) ‘Calculation of Road Traffic Noise’ (1988).

¹³ ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2 General Method of Calculation.

¹⁴ BS 6472-1 Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1 2008.

¹⁵ BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.

5.3.5 Paragraph 174 e) refers directly to noise and states that: *“e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;”*

5.3.6 Paragraph 185 also states: *“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”*

Noise Policy Statement for England (NPSE)⁶ – March 2010

5.3.7 The Noise Policy Statement for England (NPSE) was published in March 2010. It specifies the following long-term vision in policy aims: *“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- Avoid significant adverse impacts on health and quality of life;*
- Mitigate and minimise adverse impacts on health and quality of life; and*
- Where possible, contribute to the improvement of health and quality of life.”*

5.3.8 The NPSE introduced three concepts to the assessment of noise, which includes:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

5.3.9 The above categories are however undefined in terms of noise levels and for the SOAEL the NPSE indicates that the noise level will vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research is therefore required to establish what may represent an SOAEL. It is acknowledged in the NPSE that not stating specific SOAEL levels provides policy flexibility until there is further evidence and guidance.

5.3.10 The NPSE concludes how the LOAEL and SOAEL relate to the three aims listed in paragraph 5.3.8 above. The initial aim relates to avoiding significant adverse effects on health and quality of life, it then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when:

“all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.”

5.3.11 The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

Planning Practice Guidance (PPG)¹ - June 2021

5.3.12 In October 2014, the Ministry of Housing, Communities & Local Government updated the Planning Practice Guidance (“PPG”) on noise associated with Minerals, which provides guidance on the planning process. The main section of PPG was also updated in July 2019 and consultation and pre-decision matters updated in June 2021.

5.3.13 The main planning section of PPG includes a table summarising the noise exposure hierarchy, based on the likely average response to noise. Under the heading of ‘perception’ the ‘noticeable and not intrusive’ assessment of noise is defined as ‘noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such there is a perceived change in the quality of life’. The increasing effect level under these conditions is deemed to be ‘no observed adverse effect’ and no specific measures are required.

5.3.14 The PPG includes a table summarising the noise exposure hierarchy, based on the likely average response. Table 5.1 below provides the perception, example of outcome, effect and action required relative to noise:

Table 5.1: Noise Exposure Hierarchy

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect (NOEL)	No Specific Measures Required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect (NOAEL)	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/ awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

BS4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’²

5.3.15 BS4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’ is based on the measurement of background sound using L_{A90} noise measurements, compared to source noise levels measured in L_{Aeq} units. Once any corrections have been applied for source noise tonality, distinct impulses etc., the difference between these two measurements (i.e. known as the ‘rating level’) determines the impact magnitude.

- Typically, the greater the difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact (although this can be dependent on the context).
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is, relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact (although this can be dependent on the context).

5.3.16 In order to establish the rating level, corrections for the noise character need to be taken into consideration. The Standard states that when considering the perceptibility:

“Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.”

Table 5.2: BS4142:2014+A1:2019 Character Corrections

Level of Perceptibility	Correction for Tonal Character dB	Correction for Impulsivity dB	Correction for Intermittency dB	Correction for other character dB
Not Perceptible	0	0	0	0
Just perceptible	+2	+3	0	0
Clearly perceptible	+4	+6	+3*	+3*
Highly perceptible	+6	+9	+3*	+3*

BS8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’³

5.3.17 The British Standard BS8233 provides additional guidance on noise levels within buildings. These are based on the WHO recommendations and the criteria given in BS8233 for unoccupied spaces within residential properties.

5.3.18 The guidance provided in section 7.7 of BS8233 provides recommended internal ambient noise levels for resting, dining and sleeping within residential dwellings. Table 5.3 provides detail of the levels given in the standard.

Table 5.3: BS8233: 2014 Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hours}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hours}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hours}$	30 dB $L_{Aeq,8hours}$
Study and work requiring concentration	Staff/Meeting Room, Training Room Executive Office	35-45dB $L_{Aeq,8hours}$ 35-45dB $L_{Aeq,8hours}$	

5.3.19 This standard would be appropriate to apply to existing or proposed residential development. The Site noise contribution should be within the proposed internal noise levels, which would include the following noise limits:

Living room and bedroom areas: $\leq 35dB L_{Aeq,16hours}$ (0700-2300 hours) [equivalent to an external level of approximately $65dB L_{Aeq,16hours}$ based on typical standard double glazed units in the closed position and approximately $50dB L_{Aeq,16hours}$ in the open position].

Bedrooms: $\leq 30dB L_{Aeq,8hours}$ (2300-0700 hours) [equivalent to an external level of approximately $60dB L_{Aeq,8hours}$ based on typical standard double glazed units in the closed position and approximately $45dB L_{Aeq,8hours}$ in the open position].

Offices: $\leq 35dB L_{Aeq,8hours}$ [equivalent to an external level of approximately $65dB L_{Aeq,8hours}$ based on typical standard double glazed units in the closed position].

5.3.20 The above internal bedroom limits would comply with sleep disturbance criteria defined by World Health Organisation guidelines (WHO). The WHO night noise guidelines for Europe refers to sleep disturbance limit of $42dB-45dB L_{Amax}$ for regular peak events within bedrooms [which is approximately $57dB-60dB L_{Amax}$ external to the bedroom window in the open position and number of events is 10 or greater per night].

World Health Organisation (WHO) Guidelines for Community Noise: April 1999 ¹⁰

5.3.21 This document provides further updated information on noise and its effects on the community. Within the document for noise ‘*In Dwellings*’ it states that ‘*To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35dB L_{Aeq}. To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB L_{Aeq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.*”

World Health Organisation (2009) – Night noise guidelines for Europe ¹¹

5.3.22 The WHO regional office for Europe set up a working group of experts to provide scientific advice to the Member States for the development of future legislation and policy action in the area of assessment and control of night noise exposure. Considering the scientific evidence on the thresholds of night noise exposure indicated by L_{night,outside} as defined in the Environmental Noise Directive (2002/49/EC), an L_{night,outside} of 40dB should be the target of the night noise guidance (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. L_{night,outside} value of 55dB is recommended as an interim target for the countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach.

Environment Agency – Guidance: Noise and vibration management: environmental permits (July 2021) ¹⁶

5.3.23 As stated in the guidance “*Environmental permits have conditions that require operators to control pollution – this includes controlling noise and vibration..*

This guidance covers:

- *how the environment agencies will assess noise from certain industrial processes*

¹⁶ Environment Agency – Guidance (July 2021) Noise and vibration management: environmental permits.

-
- *what the law says you must do to manage noise and vibration*
 - *advice on how to manage noise – in particular, how to carry out a noise impact assessment and what operators should include in a noise management plan.*

5.3.24 Operators (or permit applicants) must consider the potential noise impact of their site. They may need to carry out noise impact assessments:

- at the permit application stage
- when applying to vary a permit
- to comply with specific permit conditions

5.3.25 The guidance advises on 4 steps that are required to when carrying out a noise impact assessment, these include:

- Desktop risk assessment – identification of any audible noise plant or operations, identification of NSRs, description and ranking of noise sources in terms of potential off-site impact, description of land between site and NSRs.
- Off-site monitoring survey – for new development this would relate to a study of the existing baseline sound conditions.
- Source assessment – noise modelling of plant or operations and if industrial source using BS4142 and ISO 9613¹³ for prediction.
- BAT or appropriate measures justification – measures to be adopted to avoid unacceptable noise pollution and demonstrate that BAT or appropriate measures would be introduced to prevent, or where that is not practicable, to minimise noise impact.

5.3.26 For vibration the guidance makes reference to BS 6472: *'Guide to evaluation of human exposure to vibration in buildings'*¹⁴.

Road Traffic Noise

5.3.27 Road traffic noise is normally assessed using the LA10 statistical noise index, which is the level of noise exceeded for ten percent of the assessment period. Daytime noise is assessed using the 18-hour LA10, following the methodology given in the Department of Transport's Calculation of Road Traffic Noise (CRTN)¹².

As such an assessment has been undertaken on the impact of road traffic in relation to the increase in noise level based on an 11.5-hour and an 18-hour average using an LA10 and LAeq index.

- 5.3.28 Some on-site noise measurements have been undertaken to inform the noise predictions along the access road to ensure the predictions are in-line with the measurements. For road traffic noise, the CRTN calculation method is normally used to predict noise levels from the movement of traffic along roadways. Alternatively, where traffic flows are very low and on-site, the use of ISO 9613-2¹³ 'line source' method is used instead. For off-site impact on the local road network the use of CRTN was more appropriate to establish the change in noise level with baseline traffic flow.
- 5.3.29 The comparison of baseline with baseline including site traffic demand predicted noise levels at NSRs is undertaken to establish any likely significant increase in overall traffic noise.
- 5.3.30 Traffic data for the CRTN assessment presented in this chapter is based on the figures contained within the Transport Statement (TS) which accompanies the ES at Chapter 4. The TA sets out existing and predicted traffic data on the local roads leading to and from the Site for the assessment year and future year based on established growth factors and any known committed developments. In this regard the impact of road traffic noise is inherently a cumulative assessment.

Guidance on Ground Vibration

- 5.3.31 Most of the available data relating to the effects of ground vibration on buildings have been obtained during tests using explosives. From these studies, two regimes of building damage have evolved, those of structural damage involving major failures of whole or parts of buildings and architectural damage involving cracking plaster or other brittle materials.
- 5.3.32 Architectural, sometimes called cosmetic, damage is thought to be more annoying than dangerous and would start to occur at lower levels of vibration than structural damage. Recent International and BS define and categorise building damage under three main headings:
- a) Cosmetic - the formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces. In addition, the formation of hairline cracks in mortar joints of brick / concrete block construction.

b) Minor - the formation of large cracks or loosening and falling of plaster or drywall surfaces, or cracks through bricks/concrete blocks.

c) Major - damage to structural elements of the building, cracks in support columns, loosening of joints, splaying of masonry cracks, etc.

5.3.33 An investigation into the effects of induced vibration undertaken by the British Standards Institution has culminated in BS7385:1993¹⁵; Part 2 which gives guide values to prevent cosmetic damage to property of 15 to 20mms⁻¹ between 4Hz and 15Hz, whilst above 40 Hz the guide value is 50mms⁻¹. The BSI suggests reducing these figures by a factor of 50% for continuous vibration, for example from rail traffic, thus the values become 7.5-10mms⁻¹ at 4-15Hz, and 25.0mms⁻¹ at 40Hz and above.

5.3.34 With regard to the threshold of cosmetic damage, for continuous vibration such as road or rail traffic, levels below 5.0mms⁻¹ are unlikely to be significant. For a given level of vibration the risk of damage decreases as the frequency of that vibration increases.

5.3.35 BS5228-2:2009 Annex B gives guidance on the effects of vibration levels, which is summarised below in Table 5.4.

Table 5.4: Guidance on Effects of Vibration Levels

Vibration Level mm.s ⁻¹	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is unlikely to be tolerable for any more than a very brief exposure to this level.

5.3.36 In terms of response limits of buildings BS5228-2:2009 (Annex B, Table B.2) refers to BS7385-1¹⁵ and BS7385-2¹⁵ and sets out guide values for transient vibration for cosmetic damage, which gives a low frequency limit of 15mm/sec

(4Hz) increasing to 20mm/sec at 15Hz for residential or light commercial buildings. For reinforced or framed structures the limit is 50mm/sec at 4Hz and above.

Vibration Nuisance

- 5.3.37 The fact that the human body is very sensitive to vibration can result in subjective concern being expressed at energy levels well below the threshold of damage.
- 5.3.38 Guidance on the human response to vibration in buildings may be found in British Standard BS 6472-1:2008¹⁴. Weighting curves related to human response to vibration of buildings are presented within this document. Estimates are given on the probability of adverse comment, which might be expected, from human beings experiencing vibration in buildings. This is based on a vibration dose value (VDV), assessed from frequency weighted vibration measurements and based on a 16-hour day and 8 hour night period.
- 5.3.39 For the purposes of assessing the potential to cause nuisance the guidance in BS6472-1:2008¹⁴ has been used.

Level and Significance of Effect

- 5.3.40 The level of an effect is a function of the sensitivity or importance of the receiver, or receptor, and the scale or magnitude of the effect. In the case of this assessment the level of the effect has been determined by reference to existing guidance and standards that are explained below.
- 5.3.41 Three types of receptor have been identified:
- Residents of existing and future houses in the vicinity of the rail sidings who could experience an increase in operational noise during daytime and night-time periods.
 - Residents on the local roads to the Site who could experience an increase in operational road traffic noise.
 - Residents of future houses adjacent to the rail sidings who could experience vibration from the operation and offloading of trains during daytime periods.

Operational Noise

- 5.3.42 The operational noise from the rail sidings can be considered in two distinct events:
- a) Train offload or loading from the rail sidings.

b) Train movement relative to the rail sidings.

Train Offloading or Loading Noise from the Rail Sidings Impacts

5.3.43 The offloading of material from trains would only take place during the daytime.

5.3.44 The operation of the railway sidings (i.e. offloading and loading of trains) is considered as an industrial noise source and therefore BS4142:2014+A1:2019² would be applicable and the semantic table of impacts (Table 5.5) would be used to assess the impact.

5.3.45 Table 5.5 shows the proposed impact magnitude methodology considering the guidance contained within BS4142: 2014+A1:2019² for fixed and mobile plant noise (e.g. Grab crane, HGV movements & locomotive etc.).

Table 5.5: Impact Magnitude Scale - Future Noise against Existing (BS4142: 2014+A1:2019)

Rating level above background noise dB(A) as BS4142: 2014+A1:2019	Description of Effect	Impact Magnitude
-10 to 0	No discernible effect on the receptor	Negligible
+0.1 to +4.4	Non-intrusive - Noise impact can be heard but does not cause any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Slight
+4.5 to +9.4	Intrusive - Noise impact can be heard and causes small changes in behaviour and/or attitude. Affects the character of the area such that there is a perceived change in the quality of life. Potential for non-awakening sleep disturbance.	Moderate
+9.5 to +14.4	Disruptive – Causes a material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep. Quality of life diminished due to change in character of the area.	Substantial
+14.5 and above	Physically Harmful – Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm	Severe

'rating' level is the difference between the noise contribution from site and the existing background sound level allowing for any adjustments required for noise characteristics (i.e. tonal, impulsive or intermittent noise character). The Standard advises that rounding of numbers to one decimal place should relate to levels of 0.5dB or above, which is reflected in the table limits. The impact magnitude scales in Tables 5.5 to 5.6 are used in the assessment of operational noise impacts.

Train Movement (along Sidings) Noise Impacts

5.3.46 For train movement along the railway line (including sidings), this is deemed to relate to transportation noise and the most appropriate noise guidance for protection of residential amenity would relate to BS8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’³ and the ProPG Planning and Noise – Professional Practice Guidance on Planning and Noise: New Residential Development⁹ - May 2017. Table 5.6 provides an assessment of impact magnitude relative to the guidance.

Table 5.6: Impact Magnitude Scale - Future Train Movement Noise Relative to Rail Sidings in accordance with BS8233:2014 and ProPG criteria

BS8233:2014 Absolute Limits dB(A) for Train Movements	Subjective Response	Impact Magnitude
Daytime Noise (0700-2300 hours) external in gardens (free field)		
<50dB(A) $L_{eq16hrs}$	Complaint unlikely	Negligible
>=50dB(A) <=55dB(A) $L_{eq16hrs}$	Complaint unlikely	Slight
>55dB(A) and <=60dB(A) $L_{eq16hrs}$	Marginal	Moderate
>60dB(A) $L_{eq16hrs}$	Complaint likely	Substantial to Severe
Night-time Noise (2300-0700 hours) external to dwelling (free field)		
<=40dB(A) L_{eq8hrs} and <=60dB(A) L_{Fmax}^1	Complaint unlikely	Negligible
>40dB(A) and <=45dB(A) L_{eq8hrs} and <=60dB(A) L_{Fmax}^1	Complaint unlikely	Slight
>45dB(A) and <=50dB(A) L_{eq8hrs} and <=60dB(A) L_{Fmax}^1	Marginal	Moderate
>50dB(A) L_{eq8hrs} or >60dB(A) L_{Fmax}^1	Complaint likely	Substantial to Severe

¹Noise events more than 10 times per night according to ProPG guidance paragraph 2.31.

Vibration

Operational Phase - Vibration

5.3.47 Table 5.7 below shows the impact in relation to LOAEL and SOAL effect levels for vibration during the operational phase of the development.

Table 5.7: Impact Magnitude Scale – Operational Phase Ground Borne Vibration for Residential Receptors

Vibration Level PPV (mms⁻¹)	Adverse Effect	Impact Magnitude	Significance Level
0.14 to 0.29	LOAEL	Negligible	Neutral
0.3 to 0.99	-	Minor	Slight
1.0 to 4.99	-	Moderate	Moderate
5 to 14.99	SOAEL	Substantial	Moderate/Major
15 or more	SOAEL	Severe	Major

Road Traffic Noise

- 5.3.48 To assess the likely impact on NSRs from noise due to increased traffic on the local road network associated with the Railway Sidings, noise calculations have been undertaken using CRTN¹² methodology and traffic flow information for the Proposed Development.
- 5.3.49 The DMRB LA 111 'Noise and Vibration'⁴ May 2020 provides guidance on the magnitude of change in terms of road traffic noise. The procedure for assessing noise impacts advises the use of a LA₁₀ measurement index based on a daytime 18-hour time period (i.e. 0600 to 2400 hours) and night-time period (i.e. 0000-0600 hours). Further assessment of the impact would be required where changes of 1dB(A) or more are expected in the short-term and changes of 3dB(A) in the long term. For robustness, we have assessed the impact relative to the operational period (i.e. 0700 to 1830 hours) rather than an 18-hour baseline.
- 5.3.50 DMRB LA 111⁴ defines the short term and long-term scenarios are considered to represent the situation when the project activities commence (short term) and 15 years after commencement (long term). The magnitude of change criteria are set out in Table 5.8 for the short term and 5.9 for the long term.

Table 5.8: Magnitude of Change – Road Traffic Noise- Short Term

Short term magnitude	Short term noise change (dB L _{A10,18hr} or L _{night})
Negligible	Less than 1.0
Minor (Slight)	1.0 to 2.9
Moderate	3.0 to 4.9
Major (Substantial/Severe)	Greater than or equal to 5.0

Table 5.9: Magnitude of Change – Road Traffic Noise- Long Term

Long term magnitude	Long term noise change (dB L _{A10,18hr} or L _{night})
Negligible	Less than 3.0
Minor (Slight)	3.0 to 4.9
Moderate	5.0 to 9.9
Major (Substantial/Severe)	Greater than or equal to 10.0

- 5.3.51 The impact magnitude categories can then be correlated with the receptor sensitivity categories provided in Table 5.10 to establish a level of effect as defined in Table 5.11.

5.3.52 In order to determine the significance of an impact, not only must the magnitude of this impact be determined but also the sensitivity of the receptors to the impact. For this assessment, the categories presented in Table 5.10 have been adopted.

Table 5.10: Receptor Sensitivity

Receptor Sensitivity	Type of Receptor
High	Dwellings/residential properties including houses, flats, old people's homes, hospitals, schools, churches, caravans and open spaces/conservation areas.
Moderate	Commercial premises including retails and offices etc.
Low	Industrial premises including warehouses and distribution etc.

5.3.53 Based upon the assessment of impact magnitude and the sensitivity of individual receptors, the matrix shown in Table 5.11 has been developed in order to provide an indication of the possible level of effect for each predicted noise impact. Given that there are many factors which may affect the level of the effect of an impact, not least, the character of the noise and timescales over which the noise operates, the overall level of effect must be assessed on an individual basis using professional judgement and experience. Therefore, whilst the matrix provides a useful indication of the likely significance it cannot be applied in all situations.

Table 5.11: Level of Effect Matrix

Impact Magnitude	Receptor Sensitivity		
	High	Moderate	Low
Severe	Major	Major/Moderate	Moderate/Minor
Substantial	Major/Moderate	Moderate	Minor
Moderate	Moderate	Moderate/Minor	Minor/Neutral
Slight	Minor	Minor/Neutral	Neutral
No significant impact (negligible)	Neutral	Neutral	Neutral

5.3.54 Where a level of effect is defined as **Major or Major/Moderate** then the effect is likely to be considered significant i.e. an impact that is likely to be a key material factor in the decision-making process.

Scope

5.3.55 The noise assessment identifies potential noise and vibration impacts associated with the Rail Sidings facility on existing and future neighbouring NSR during its operation. The assessment considers the highest likely impacts relating to the arrival and departure of trains during daytime and night-time periods and the offloading of train wagons during daytime. Additional analysis of any additional vehicle movements on the local roads is assessed. Where required, details of a

mitigation strategy are provided to ensure compliance with relevant guidance and standards and protection of residential amenity.

Limitations

5.3.56 The Stewartby Brickworks mixed use development has outline permission, which includes residential housing but the detailed design has not been fully developed. We have therefore reviewed the draft master plan layout, parameter plans, ES Noise & Vibration Chapter and ES Addendums to enable reasonable assumptions to be made on the likely nearest receptor positions for robustness.

5.4 Baseline

Data Sources

5.4.1 The following sources of data have been used in order to support and undertake analysis of baseline levels and noise predictions:

- a) Baseline sound data from a survey undertaken in August 2019 by NVC Ltd for the planning submission for the proposed Leachate Treatment Plant Facility (planning consent ref. 20/01604/FULWM).
- b) Baseline sound data from a survey undertaken by Burrohappold Engineering in May 2018 as part of the Environmental Statement Noise Assessment for the Stewartby Brickworks planning submission (planning consent ref. 18/03022/EIA)
- c) Empirical noise level data from library data obtained by NVC Ltd at an existing FCC landfill site in the UK that utilises a rail siding.

5.4.2 The local sound environment around the future NSRs is generally formed by noise from distant road traffic movements, intermittent main line train movements and distant landfill associated noise sources.

5.4.3 The baseline survey in 2019 was undertaken for the purpose of a noise impact assessment relating to the LTP at monitoring positions to represent NSRs adjacent to the LTP, which is also in proximity to the Proposed Development.

5.4.4 The monitoring positions are shown on Figure 5.1. The results of the noise monitoring surveys provide typical broadband data of the sound climate at these receptors. Details of the instrumentation used for the latest sound survey are detailed in Appendix 5-2.

5.4.5 The background sound survey was carried out in accordance with the advice given in BS4142: 2014. The sound survey and site inspection were carried out on Friday 16th to Monday 18th August 2019. Static noise measurements were undertaken in the area adjacent to the nearest residential properties to establish representative data on the existing sound climate (i.e. Position A). Position B represents a position that is indicative of potential residential development at the former Stewartby Brickworks.

5.4.6 The monitoring positions and identified NSRs are as follows:

- Location A: Stewartby Village
- Location B: Closest proposed residential property (Northeast of Stewartby Brickworks site)

Existing Background Sound Survey Results

5.4.7 The results of measurements taken at the monitoring positions are presented in Table 5.12 and detailed measurements are provided in Appendix 5-3.

Table 5.12: Residual & Background Sound Levels at Monitoring Positions

Location	Time Period	LAeq dB	LA10 dB	LA90 dB	Representative LA90 dB	LAmx dB
A. East off Broadmead Road	0700-2300	55	59	46	46	64-86
A. East off Broadmead Road	2300-0700	46	47	39	38	43-75
B. North east of Brickworks	0700-2300	54	56	46	46	52-83
B. North east of Brickworks	2300-0700	46	46	40	40	48-84

5.4.8 The results of baseline noise monitoring taken at the monitoring positions indicate that representative background and residual sound levels during the daytime period at the NSR were 46dB L_{A90} and 54dB to 55dB L_{Aeq16hrs}. During night-time periods, the background representative level at Broadmead Road and northeast of the Brickworks site respectively was 38dB to 40dB L_{A90,8hrs} and 46dB L_{Aeq8hrs}.

5.4.9 The Burrohappold Engineering Noise Chapter for the Stewartby Brickworks ES at the 24 hour fixed position survey at a location to the southeast of the Brickworks Site and 10m from Green Lane in May 2018 was shown to result in a background daytime level of 48dB L_{A90,16hrs} and 40dB L_{A90,8hrs} (ref. paragraph 7.3.7). This provides a similar result to that determined in the NVC baseline study in 2019.

Identification of Noise Sensitive Receptors (NSRs)

Residential Receptors (Existing or Proposed)

- 5.4.10 Based on distance relative to the Proposed Development, the existing NSRs are located northeast to southeast of the Site, off Broadmead Road at (Receptors R1). The closest receptors are located at circa 400m from the nearest Site activity. Refer to Figure 5.1 for receptor locations.
- 5.4.11 Future NSRs that relate to the permitted but not developed Former Brickworks Mixed Use Site (including 1,000 new homes) located southeast and south of the Site (Receptor R2) are located at circa 39m at its closest distance from the nearest likely activity within the residential development area. Refer to Figure 5.1 for potential location of receptors.

5.5 Assessment of Effects

- 5.5.1 The measure that is generally used in noise assessments and is recommended internationally for the description of environmental noise is the equivalent continuous noise level or L_{Aeq} parameter.
- 5.5.2 In general, the level of noise in the local environs that arises from the development site will depend on a number of factors. The more significant of which are:
- The sound power levels (SWL's) of the plant or equipment used on site.
 - The frequency content and characteristics of the noise source.
 - The periods of operation of the plant on site.
 - The distance between the source noise and the receiving position.
 - The presence or absence of screening effects due to barriers, or ground absorption.
 - Any reflection effects due to the facades of buildings etc.
- 5.5.3 The calculation method used in this study is based upon ISO9613-2¹³ noise propagation model, which takes into account source position, frequency content, screening effects, distance and direction in relation to the nearest receptor. For site operational noise we have used CadnaA software for producing noise maps of the highest likely generated noise. The assessment has used empirical field data taken from a similar FCC rail siding site to calculate the expected resultant noise contribution at the nearest property boundary locations during daytime operations. The noise model provides predicted noise levels at each of the receptor points listed in sections 5.4.8 and 5.4.9.

5.5.4 An assessment has been undertaken on the following:

- offloading of trains at the rail sidings
- movement of trains to and from the rail sidings

Incorporated Mitigation

5.5.5 Predicted noise levels from the Rail Sidings have been calculated using the noise levels provided within Appendix 5-5. These noise levels are based on library data from similar plant used on other FCC UK sites and include the following assumed inherent mitigation measures:

- (i) Vehicles fitted with non-tonal reversing alarms (i.e. broadband type noise alarms).
- (ii) Vehicles to travel along a one-way system to and from the Rail Sidings to minimise the need for the use of reversing alarms.
- (iii) Use of a wheeled excavator with grab to be used rather than a tracked excavator to minimise noise.
- (iv) Offloading of train wagons to be undertaken on the northern side of the train.
- (v) Noise levels of mobile plant and train movements as detailed in Appendix 5-5.

5.5.6 The assessment of effects should take into account any mitigation measures that have been specifically incorporated into the development proposals to reduce environmental effects of the project.

Construction Phase

5.5.7 There are no construction works required as part of the Proposed Development as the train lines for the sidings exist. Construction noise is therefore scoped out of this assessment.

Operation Phase Effects

Train Offloading or Loading Activities

Assessment of Effects against Baseline (BS4142 Criteria)

5.5.8 The assessment of effects of noise from the offloading or loading of trains at the NSRs when set against baseline is considered and our expert opinion is provided below (i.e. in accordance with BS4142:2014+A1:2019²):

-
- a) In respect of the offloading of trains during daytime hours (as proposed) tonal noise from the wheel grab and associated 8 wheeled tipper lorries may produce some low level tonal character and without additional mitigation measures the character penalty is likely to be 'just perceptible' at the Stewartby Brickworks NSR and a +2dB correction. With additional mitigation and operation strategy, the predicted noise character is not expected to be required.
 - b) In terms of impulsivity during the offloading of trains at the sidings, impulse noise from the grab loading tippers may produce some impulse noise. Without additional mitigation at the Stewartby Brickworks NSR the impulse noise correction is likely to be +6dB and with additional mitigation and operation strategy, the highest likely impacts would reduce to +3dB and 'just perceptible' character. At NSRs beyond the Stewartby Brickworks site no noise character penalty is expected.
 - c) The offloading of trains would take up to around 4 hours and therefore a relatively consistent activity rather than distinctly intermittent. We would therefore not expect this character correction to be applicable with or without mitigation.

5.5.9 In conclusion, when taking into account tonality and impulse noise character, we would expect that without additional mitigation measures the noise character penalty for train offload at the Stewartby Brickworks site NSRs would be +8dB(A). With the proposed additional mitigation this is expected to change to +3dB for train offload. This opinion is deemed to be a conservative assessment of character based on a cautious view of this activity. No noise character penalty is expected at Broadmead Road receptors (R1).

Daytime Operations

5.5.10 Table 5.13 provides information on the predicted noise levels during daytime operations from the Rail Sidings (i.e. in accordance with BS4142: 2014+A1:2019² and 07.00 to 23.00 hours).

Table 5.13: Predicted Daytime Noise Contribution from the Offloading or Loading of Trains when applying BS4142:2014+A1:2019 (inherent mitigation)

Receptor Position (Refer to Figure 5.1)	Time Period (0700-1830 hours)	Predicted Rating Noise Level from Site L _{Aeq} 1hr dB	Assessment ² Baseline Sound Level L _{A90} dB [L _{Aeq}]	Rating compared to Baseline Sound L _{Aeq} 1hr dB	Impact according to BS4142:2019
Existing Residential Receptors					
R1. Broadmead Rd	0700-0800 (Mon-Fri)	30-36	48 [57]	-18 to -12	Low
R1. Broadmead Rd	0800-0900 (Mon-Fri)	30-36	46 [59]	-16 to -10	Low
R1. Broadmead Rd	0900-1000 (Mon-Fri)	30-36	46 [58]	-16 to -10	Low
R1. Broadmead Rd	1000-1830 (Mon-Fri)	30-36	48 [57]	-18 to -12	Low
R1. Broadmead Rd	0700-0800 (Sat)	30-36	43 [53]	-13 to -7	Low
R1. Broadmead Rd	0800-0900 (Sat)	30-36	44 [54]	-14 to -8	Low
R1. Broadmead Rd	0900-1700 (Sat)	30-36	45 [56]	-15 to -9	Low
Future Residential Receptors					
R2. Stewartby Brickworks	0700-0800 (Mon-Fri)	51-64 ¹	47 [53]	+4 to +17	Below Adverse to Significant Adverse
R2. Stewartby Brickworks	0800-0900 (Mon-Fri)	51-64 ¹	44 [54]	+7 to +20	Adverse to Significant Adverse
R2. Stewartby Brickworks	0900-1000 (Mon-Fri)	51-64 ¹	44 [53]	+7 to +20	Adverse to Significant Adverse
R2. Stewartby Brickworks	1000-1830 (Mon-Fri)	51-64 ¹	48 [57]	+3 to +16	Below Adverse to Significant Adverse
R2. Stewartby Brickworks	0700-0800 (Sat)	51-64 ¹	43 [51]	+8 to +21	Adverse to Significant Adverse
R2. Stewartby Brickworks	0800-0900 (Sat)	51-64 ¹	44 [53]	+7 to +20	Adverse to Significant Adverse
R2. Stewartby Brickworks	0900-1700 (Sat)	51-64 ¹	45 [56]	+6 to +19	Adverse to Significant Adverse

Note 1: Noise characteristics included at R2, which includes +8dB for tonality and impulsivity.

Note 2: Based on representative LA90 baseline results from 2019 at NSRs.

Note 3: Baseline levels measured at Location B north east of Brickworks are the most relevant background & residual levels.

- 5.5.11 The fifth column in Table 5.13 shows the difference between the predicted rating noise level and the background sound level at the NSRs. The rating level in column 3 is in accordance with the methodology found within BS 4142: 2014+A1:2019².
- 5.5.12 According to BS4142: 2014+A1:2019², the rating level relative to the assessment baseline noise would indicate **negligible** impact magnitude at receptors at greater distance than the Stewartby Brickworks Site i.e. Receptors R1 (refer to Table 5.5). At the future NSRs at the Stewartby Brickworks Site (R2), the predicted impact according to BS4142:2014+A1:2019² would be below adverse to significant adverse and a **slight to severe** impact magnitude. The operational noise impacts from the offloading of trains are therefore considered to represent a **neutral** level of

effect at existing receptors which would not be significant. For future NSRs, which are in proximity to the rail sidings, without additional mitigation, this would present a **minor to major** level of effect and would be significant. Section 5.7 details further mitigation measures proposed.

Train Movement at Rail Sidings

Assessment of Effects against BS8233:2014³ and ProPG⁹ Criteria

5.5.13 The assessment of effects of noise from the movement of trains at the NSRs when set against BS8233:2014³ and ProPG¹ noise criteria is considered and represented in Table 5.14.

5.5.14 Table 5.14 provides information on the predicted noise levels during daytime and night-time from the arrival or departure of trains.

Table 5.14: Predicted Daytime and Night-time Noise Contribution from the Movement of Trains at the Rail Sidings when applying BS8233:2014 or ProPG:2017 Criteria (inherent mitigation)

Receptor Position (Refer to Figure 5.1)	Time Period	Predicted Noise Level from Site L _{Aeq,T} dB	Predicted Noise Level from Site L _{Amax} dB	BS8233:2014 & ProPG:2017 Limit Criteria L _{Aeq,T} or L _{Amax} dB	Impact when comparing site noise to PPG criteria
Existing Residential Receptors					
R1. Broadmead Rd	Daytime (0700-1830)	24-29	39-44	>60dB L _{Aeq,16hrs}	Negligible
	Night-time (2300-0700)	24-29	39-44	>50dB L _{Aeq,8hrs} or >60dB L _{Amax}	Negligible
Future Residential Receptors					
R2. Stewartby Brickworks	Daytime (0700-1830)	42-46	57-61	>60dB L _{Aeq,16hrs}	Negligible
	Night-time (2300-0700)	42-46	57-61 ¹	>50dB L _{Aeq,8hrs} or >60dB L _{Amax}	Moderate

¹The number of L_{Amax} events at night-time would not reach 10 and therefore moderate impact and not significant.

5.5.15 According to BS8233:2014³ & ProPG¹ guidance, the Site generated noise level relative to the noise limits show a **negligible** impact magnitude during daytime periods (refer to Table 5.6). The noise impact from the daytime train movement is therefore considered to represent a **negligible** level of effect and not significant.

5.5.16 During the night-time period, according to BS8233:2014 & ProPG guidance, the site generated noise level relative to the noise limits show a **negligible to moderate** impact magnitude (refer to Table 5.6). The noise impact from the night-time train movement is therefore considered to represent a **negligible to moderate** level of effect and would not be significant with the inherent mitigation measures.

Any moderate impacts would, in any case, be reduced further by additional operational and screening mitigation measures (as defined in paragraph 5.7.1) resulting in a negligible to slight impact.

Operational Road Traffic Noise

5.5.17 The Transport Statement considers the assessment opening year (2023) and future years (2028 and 2031) for the traffic demand from the Proposed Development for these periods compared to a ‘Do-nothing’ scenario. Table 5.15 provides details of the noise impact due to the increased traffic flow along the local road network based on a 11.5-hour average for the opening year using the traffic data provided within the Transport Assessment.

Table 5.15: Predicted Change in Road Traffic Noise on Local Road Network

Road	Year	‘Do nothing’ LA10 _{11.5hours} (dB)	‘Do something’ LA10 _{11.5hours} (dB)	Change (with development) LA10 _{11.5 hours} (dB)
Green Lane	2023	66.6	68.1	+1.5
Green Lane	2028	66.7	68.1	+1.4
Green Lane	2031	67.0	68.4	+1.4

Note: The predicted noise levels are based on a notional 10m distance from the kerbside. Impacts beyond Green Lane would be similar or lower due to the distribution of site traffic onto the local road network.

5.5.18 Based on a maximum HGV demand the impact shows **slight** impact magnitude and **minor** level of effect in respect of traffic movements relative to the nearest local road network at nearest residential properties. In terms of the DMRB LA 111⁴ guidance, in relation to short-term effects (refer to Table 5.8) an increase of <3dB(A) is minor and <1dB(A) is negligible.

Vibration Effects

5.5.19 The highest levels of vibration generated by Site plant is likely to include the following:

- Freight Train movement at the sidings
- Material offloading onto HGV Tipper Lorries

5.5.20 Table 5.16 outlines the highest likely vibration levels that could be experienced during construction at the NSRs (i.e. during train movement and offloading activities).

Table 5.16: Vibration at NSRs from Train Movement and Offloading of Material onto HGV at Rail Sidings

Receptor	Type of Vibration Source	Approximate Nearest Distance to Receptor (m)	Receptor Sensitivity	Range of highest likely vibration (mm/sec)	Perceptible levels of vibration for residential receptors (mm/sec)	Cosmetic damage limits (mm/sec)
R1. Broadmead Rd	Train movement Offload train	350 350	High High	0 0	>0.3 >0.3	>5.0 >5.0
R2. Stewartby Brickworks	Train movement Offload train	39 39	High High	<0.1 0 to 0.1	>0.3 >0.3	>5.0 >5.0

- 5.5.21 The above results show no significant vibration levels during site operations and train movement and the highest likely vibration levels below the level of perception at NSRs. Appendix 5-6 provides example levels of vibration from train movement during daytime and night-time at 10m from a mainline railway track and construction vibration levels from the use of loaded trucks and construction plant relative to distance. The example of movement of trains at 10m distance from trackside (which included 4 night-time goods trains) also shows that according to BS6472-1: 2008¹⁴ the level of vibration was below the threshold of a 'low probability of adverse comment' and therefore an adverse comment is not expected.
- 5.5.22 The distance from the nearest residential receptors to any likely use of mobile plant offloading material and train movement into the sidings is likely to be a minimum distance of circa 39m.
- 5.5.23 In terms of HGV movement on local roads passing receptors, a number of noise and vibration studies of the movement of HGVs along local roads adjacent to residential properties in the UK, have been undertaken by the author of this assessment. This has included a study where monitoring has taken place within 1m of the kerbside. The results show at positions close to the pavement edge this only just triggers the seismograph and at levels below or just around perceptibility. The vibration levels from vehicle movements are well below cosmetic damage levels and highly unlikely to generate vibration that would constitute a nuisance according to BS6472: 2008¹⁴.
- 5.5.24 Based upon the above, even at the closest approach to existing residential properties and assuming the highest likely plant vibration, the levels of ground-

borne vibration from rail siding activity would be below perceptible levels (i.e. 0.3mm/s) at all receptors. The results of empirical measurements of vibration from vibratory plant at distances greater than 30m according to BS6472:2008 would indicate that the vibration levels are unlikely to give rise to an 'adverse comment' from a nuisance aspect.

5.5.25 It should be noted that the type of equipment, ground conditions and structural form could all affect the resultant level of vibration. At this stage, it has been assumed that the highest likely vibration level scenario occurs (i.e. a conservative estimate of potential effects).

5.5.26 The levels of vibration, as a result of construction, without mitigation are likely to result in an impact magnitude classification of **negligible** and a level of effect of **neutral** during general and highest likely generated vibration.

5.6 Cumulative Effects

5.6.1 Cumulative impacts considered include the following planning developments that are:

(i) 18/02940/EIA - Bedford Business Park

5.6.2 This proposed development is located on land to the east of the landfill site circa 300m from the Proposed Development. A noise impact assessment was provided for the planning submission (ref: Burohappold Engineering dated October 2018). The report shows predicted noise levels from this site would be negligible and the design of plant would not exceed background sound level at NSRs (i.e. northeastern end of Stewartby Village at circa 200m). The impact on the Stewartby Brickworks residential site, which is at greater distance than Stewartby Village, would therefore also be negligible and no significant cumulative impacts likely to occur for this development.

(ii) Stewartby Brickworks Mixed Use Development

5.6.3 This development includes for around 1000 dwellings, 1.4 hectares of B1,B2 & B8 employment land, school, retail development, play areas, open space and green infrastructure. An ES Noise & Vibration Chapter was provided for the planning submission and further addendum reports to show a commitment to the provision of mitigation to control noise from associated land uses (i.e. rail sidings, railway line, landfill and associated leachate plant treatment and gas engine facility). The

noise assessment impact from the development on existing and proposed NSRs shows negligible impact from on-site operations and adjacent land uses and minor impact from associated operational road traffic. The planning consent conditions include a requirement for the detailed design to provide protection of residential amenity and to verify that specific conditioned noise limits are complied with. In view of the type of development, analysis within the noise and vibration ES chapter/addendums and planning conditions, no significant cumulative impacts is expected.

(iii) Marston Vale Innovation Park Development

5.6.4 This application comprises a number of uses which include light industrial, general industrial/ storage and distribution, food and drink, public house, hotel, office, research and development, access, parking, drainage, landscaping and associated works. An environmental noise assessment was submitted as part of the planning submission by Sharps Gayler. The results of the noise predictions and mapping indicate that at a distance of circa 600m south of the development (i.e. towards the Stewartby rail sidings and Brickworks residential development) the daytime levels with all plots in operation would indicate a noise level between 30dB to 35dB LAeq_{1hr} during daytime and 25-30dB LAeq_{1hr} during night-time. At the separation distance of circa 1km to 1.1km to the nearest potential resident at the Brickworks development, the levels would drop by around 5dB. This would be more than 10dB below any noise contribution from the rail sidings and therefore no significant cumulative effect would occur.

(iv) The Rookery South Resource Recovery Facility (Covanta)

The development is a waste incineration plant located at Rookery Pit, Stewartby. This is located south of the Stewartby Rail Sidings at a distance of circa 1.6km. The Development Consent Order (DCO) details the Authorised Development Schedule (Part 1) which sets out the noise limits for the construction and operation phase of the Development (i.e. sections 17 and 18). The construction phase is limited to a daytime level of 55dB LAeq_{1hour} at residential locations and during the operational phase at Stewartby Way a limit of 35dB LAeq_T during daytime and night-time periods. Stewartby Way is circa 1.3km from Covanta and the rail sidings circa 2km. The noise contribution from the Covanta operations would be 3-4dB lower than the noise limit of 35dB and therefore not significant and no significant cumulative effect

would occur. If construction works occurred at the same time as the operation of the rail sidings the cumulative effect would only be minor and not significant.

Future Baseline

5.6.5 The Site has been assessed against the current baseline which includes some of the permitted and existing noise sources in the area around the Proposed Development (e.g. Leachate Treatment Plant Facility, Gas Engine Compound Facility, Landfill Site, road traffic and train movement). The additional permitted developments which are not yet built, are unlikely to have any significant effect on future baseline levels, but any minor increase, as a result of additional traffic movements on background levels at NSRs would only help to reduce Site operational impacts (i.e. an increase in background level compared with site generated noise would be lower than assessed). Impacts from permitted but not built development in respect of road traffic noise increase is taken into consideration within the transport assessment baseline.

5.7 Additional Mitigation

Operational Mitigation

5.7.1 Without additional mitigation measures the potential effects of the Proposed Development could result in significant effects at the NSR on the Stewartby Brickworks Site. To avoid any significant effects, as and when the future receptors are built and occupied, then additional noise mitigation would be required. These would include the following additional measures which are all standard commonly applied forms of mitigation incorporated at other similar facilities operating in the UK.

- Where offloading of train wagons is to commence during the period between 0700 to 0900 hours, this is to be undertaken initially at the western end of the sidings track and work towards the east direction. This ensures any early morning offloading is at the furthest point from the Stewartby Brickworks NSRs (as it takes around 4 hours to offload). By the time the train offload reaches the eastern end the baseline levels would have increased to reduce impacts.
- Installation of an acoustic screen which would run parallel with the rail sidings track closest to the southern boundary with the Stewartby Brickworks residential development site. In order to provide sufficient attenuation relative to

a potential 3 storey property the screen would be constructed to a height of 6m and would be solid having a minimum mass of 15-20kg/m². This would be formed by a solid close-boarded fence. The approximate location of the screen is indicated in Figure 5.2 attached.

- The Stewartby Brickworks residential development which is permitted but not yet developed (planning ref. 18/03022/EIA) includes a planning consent condition relating to noise. This requires demonstration that the dwellings would be protected against noise from road, rail and industrial noise sources. The indicative plan shows dwellings being proposed at the northeastern end of the site and adjacent to the rail sidings and the main line of the existing railway line. Irrespective of the rail sidings noise contribution, the developer will need to show that the properties are protected against the stated noise sources and this would include the existing train movements along the main line (i.e. train movement not associated with the rail sidings). The condition requires noise levels inside bedrooms to be protected during daytime and night-time periods (i.e. condition 08) where the L_{Aeq} level should not exceed 35dB between 0700-2300 hours and 30dB and L_{max}, fast of 45dB(A) between 2300 to 0700 hours. As stated in the Burohappold Engineering noise impact assessment report (ref. Stewartby Brickworks – Industrial Noise Sources: Noise Impact Assessment 0041461 Rev 1 dated 7 December 2020), options would be considered to protect occupants from these other noise sources including enhanced glazing, passive trickle and mechanical ventilation, winter gardens and layout/single aspect design approach. This additional mitigation required by the developer of the residential site for the main line trains and any other industrial or transportation source would provide further protection of amenity. This would be developed as and when the Stewartby Brickworks site land area is developed in detail and is controlled by condition.

5.8 Residual Effects and Conclusions

- 5.8.1 The assessment of impact on existing residential areas from any increase in road traffic noise during the daytime the operational stage of the Proposed Development shows no significant change in noise levels and therefore there is likely to be a **slight** magnitude impact at receptors, resulting in a **minor** level of effect. The effect would not be significant.

5.8.2 In terms of vibration during the operational period, there would be a **negligible** magnitude impact, resulting in a **neutral** level of effect at the nearest residential receptor and well within guidance limits for nuisance and cosmetic damage. The effect would not be significant.

5.8.3 The following analysis considers the effect of the additional mitigation measures on the predicted operational phase noise levels. Table 5.17 provides information on the predicted noise levels during daytime operations from the Proposed Development (07.00 to 18.30). It includes details of the established representative baseline levels in terms of LA90 (i.e. index used for background sound levels) and LAeq (i.e. index used for residual sound levels), together with the predicted noise from the Proposed Development and a comparison of these predictions with background and noise impacts according to BS4142².

Table 5.17: Predicted Daytime Noise Contribution from the Offloading or Loading of Trains when applying BS4142:2014+A1:2019 (with additional mitigation)

Receptor Position (Refer to Figure 5.1)	Time Period (0700-1830 hours)	Predicted Rating Noise Level from Site L _{Aeq1hr} dB	Assessment ² Baseline Sound Level L _{A90} dB [L _{Aeq}]	Rating compared to Baseline Sound L _{Aeq1hr} dB	Impact according to BS4142:2019
Existing Residential Receptors					
R1. Broadmead Rd	0700-0800 (Mon-Fri)	29-33	48 [57]	-19 to -15	Low
R1. Broadmead Rd	0800-0900 (Mon-Fri)	29-33	46 [59]	-17 to -13	Low
R1. Broadmead Rd	0900-1000 (Mon-Fri)	29-33	46 [58]	-17 to -13	Low
R1. Broadmead Rd	1000-1830 (Mon-Fri)	29-33	48 [57]	-19 to -15	Low
R1. Broadmead Rd	0700-0800 (Sat)	29-33	43 [53]	-14 to -10	Low
R1. Broadmead Rd	0800-0900 (Sat)	29-33	44 [54]	-15 to -11	Low
R1. Broadmead Rd	0900-1700 (Sat)	29-33	45 [56]	-16 to -12	Low
Future Residential Receptors					
R2. Stewartby Brickworks	0700-0800 (Mon-Fri)	43-47 ^{1&3}	47 [53]	-4 to 0	Low
R2. Stewartby Brickworks	0800-0900 (Mon-Fri)	43-47 ^{1&3}	44 [54]	-1 to +3	Low to Below Adverse
R2. Stewartby Brickworks	0900-1000 (Mon-Fri)	43-47 ¹	44 [53]	-1 to +3	Low to Below Adverse
R2. Stewartby Brickworks	1000-1830 (Mon-Fri)	43-47 ¹	48 [57]	-5 to -1	Low
R2. Stewartby Brickworks	0700-0800 (Sat)	43-47 ^{1&3}	43 [51]	0 to +4	Low to Below Adverse
R2. Stewartby Brickworks	0800-0900 (Sat)	43-47 ^{1&3}	44 [53]	-1 to +3	Low to Below Adverse
R2. Stewartby Brickworks	0900-1700 (Sat)	43-47 ¹	45 [56]	-2 to +2	Low to Below Adverse

Note 1: Noise characteristics included at R2, which includes +3dB for impulsivity.

Note 2: Based on representative LA90 baseline results from 2019 at NSRs.

Note 3: With starting at the western end of the track the 0700 to 0900 during weekdays and Saturday period would be towards the lower end of the predicted range (in column 3) and therefore lower impact.

Note 4: No allowance is made for any local screening from the train itself relative to the grab crane and HGV tipper lorries, which may slightly reduce radiated noise levels to the south.

Note 5: Baseline levels measured at Location B north east of Brickworks are the most relevant background & residual levels.

5.8.4 The fifth column in Table 5.17 shows the difference between the predicted rating noise level and the background sound level at the NSRs. The rating level in column 3 is in accordance with the methodology found within BS 4142: 2014+A1:2019².

5.8.5 According to BS4142: 2014+A1:2019², the rating level relative to the assessment baseline noise would indicate **negligible** impact magnitude at receptors at greater distance than the Stewartby Brickworks Site i.e. Receptor R1 (refer to Table 5.5). At the future NSRs at the Stewartby Brickworks Site, the predicted impact according to BS4142:2014+A1:2019 would be below adverse to significant adverse and a **negligible to slight** impact magnitude. The operational noise impacts from the offloading of trains are therefore considered to represent a **neutral to minor** level of effect at existing receptors which would not be significant.

Train Movement at Rail Sidings

Assessment of Residual Effects against BS8233:2014³ and ProPG⁹ Criteria

5.8.6 The assessment of residual effects of noise from the movement of trains at the NSRs when set against BS8233:2014 and ProPG noise criteria with additional mitigation is considered and represented in Table 5.18.

Table 5.18: Predicted Daytime and Night-time Noise Contribution from the Movement of Trains at the Rail Sidings when applying BS8233:2014 or ProPG:2017 Criteria (with additional mitigation)

Receptor Position (Refer to Figure 5.1)	Time Period	Predicted Noise Level from Site L _{Aeq,T} dB	Predicted Noise Level from Site L _{Amax} dB	BS8233:2014 & ProPG:2017 Limit Criteria L _{Aeq,T} or L _{Amax} dB	Impact when comparing site noise to PPG criteria
Existing Residential Receptors					
R1. Broadmead Rd	Daytime	29-34	44-59	>60dB	Negligible
	Night-time	29-34	44-59	>50dB or >60dB L _{Amax}	Negligible
Future Residential Receptors					
R2. Stewartby Brickworks	Daytime	40-44	55-59	>60dB	Negligible
	Night-time	40-44	55-59	>50dB or >60dB L _{Amax}	Negligible to Slight

¹Note: Maximum possible train arrivals would be 3 during daytime or night-time

5.8.7 According to BS8233:2014³ & ProPG⁹ guidance, the site generated noise level relative to the noise limits show a **negligible** impact magnitude during daytime periods (refer to Table 5.6). The noise impact from the daytime train movement is therefore considered to represent a **negligible** level of effect and not significant.

5.8.8 During the night-time period, according to BS8233:2014 & ProPG guidance, the site generated noise level relative to the noise limits show a **negligible to minor** impact magnitude (refer to Table 5.6). The noise impact from the night-time train movement is therefore considered to represent a **negligible to minor** level of effect and therefore not significant with the additional mitigation measures.

5.8.9 In summary, no significant noise or vibration effects have been identified by the noise assessment in relation to the operation of the Proposed Development. Table 5.19 summarises the predicted effects of the operation of the Proposed Development.

Table 5.19: Residual Impact at Nearest Receptor after Mitigation Measures

Source	Nature of Effect	Time Period	Effect	Proposed Mitigation	Residual Effect	Residual Impact Magnitude
Road traffic noise (operational)	Direct & Permanent	Daytime	Minor	Inherent traffic routes	Minor	Slight
Train noise (operational)	Direct & Permanent	Daytime Night-time	Neutral Negligible to Moderate	Acoustic Screening	Neutral Neutral to Minor	Negligible Negligible to Slight
Operational Vibration	Direct & Permanent	Daytime Night	Neutral Neutral	Ongoing Maintenance	Neutral Neutral	Negligible Negligible
Operational Noise	Direct & Permanent	Daytime	Neutral to Major	Acoustic Screening	Neutral to Minor	Negligible Negligible to Slight
Cumulative Effects	Direct & Permanent	Daytime	Neutral	None	Neutral	Negligible

Summary

5.8.10 Noise and vibration levels have been considered and assessed for the Proposed Development. Relevant and appropriate noise and vibration guidance and standards have been used to determine the impact. The assessment has been undertaken to inform and guide the design of the Proposed Development, such that any likely noise and vibration impact on existing and potential sensitive receptors is minimised.

5.8.11 To establish any likely impact from noise an assessment of baseline sound levels has been considered by undertaking fixed position noise monitoring at two noise sensitive receptor areas around the Site. This was carried out over a weekend

period in August 2019 to establish the lowest likely representative background levels.

5.8.12 In relation to the operational phase a number of potential mitigation measures have been proposed to ensure that the resultant operational noise levels are within appropriate guidance and standards. The measures would be based on the employment of Best Practicable Means to mitigate any potential peak noise sources.

5.8.13 The assessment shows that there would be no significant impacts during the operation of the Proposed Development following the implementation of appropriate mitigation.

Appendix C – Flood Risk Assessment



Stewartby Rail Sidings, Bedford, MK43 9LY

NPPF: Flood Risk Assessment

For Axis

KRS.0310.054.R.001.E

May 2022

www.krsenvironmental.com

CONTACT DETAILS

Registered Office:
 KRS Environmental Ltd
 3 Princes Square
 Princes Street
 Montgomery
 Powys
 SY15 6PZ

Tel: 01686 668957
 Mob: 07857 264 376

Email: keelan@krsenvironmental.com
 Web: www.krsenvironmental.com
 LinkedIn: uk.linkedin.com/in/keelanserjeant/

Office also at:
 KRS Environmental Ltd
 The Media Centre
 7 Northumberland Street
 Huddersfield
 West Yorkshire
 HD1 1RL

Tel: 01484 437420
 Mob: 07857 264 376

Stewartby Rail Sidings, Bedford, MK43 9LY

Project	NPPF: Flood Risk Assessment
Client	Axis
Status	Final
Prepared by	Ruth Evans
Reviewed by	Keelan Serjeant BSc (Hons), MSc, MCIWEM
Date	May 2022

Disclaimer:

This report has been produced by KRS Environmental Limited within the terms of the contract with the client and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

CONTENTS

CONTACT DETAILS	i
CONTENTS	i
TABLES & FIGURES	ii
EXECUTIVE SUMMARY	iii
1.0 INTRODUCTION	1
1.1 Background	1
1.2 National Planning Policy Framework (NPPF)	1
1.3 Report Structure	2
2.0 LOCATION & DEVELOPMENT DESCRIPTION	3
2.1 Site Location	3
2.2 Existing Development	3
2.3 Proposed Development	3
2.4 Ground Levels	3
2.5 Catchment Hydrology/Drainage	3
2.6 Ground Conditions.....	5
3.0 FLOOD RISK	6
3.1 Sources of Flooding	6
3.2 Environment Agency.....	6
3.3 Bedfordshire & River Ivel IDB	6
3.4 Bedford Borough Council.....	6
3.5 Historic Flooding.....	6
3.6 Existing and Planned Flood Defence Measures.....	7
3.7 Environment Agency Flood Zones	7
3.8 Flood Vulnerability.....	9
3.9 Climate Change.....	10
3.10 Fluvial (river) Flooding	10
3.11 Tidal (coastal) Flooding.....	13
3.12 Groundwater Flooding.....	13
3.13 Surface Water (pluvial) Flooding	13
3.14 Sewer Flooding	14
3.15 Flooding from Artificial Drainage Systems/Infrastructure Failure.....	15
3.16 Effect of the Development on Flood Risk	15
3.17 Summary of Site Specific Flood Risk Assessment	15
4.0 SURFACE WATER DRAINAGE	17
4.1 Surface Water Management Overview	17
4.2 Surface Water Runoff Rate / Volume	17
5.0 SEQUENTIAL APPROACH	18
5.1 Sequential / Exception Tests.....	18
6.0 SUMMARY AND CONCLUSIONS	19
6.1 Introduction.....	19
6.2 Flood Risk.....	19
6.3 Surface Water Drainage.....	19
6.4 Sequential Approach	20
6.5 Conclusion	20
APPENDICES	21
APPENDIX 1 – Site Layouts.....	22
APPENDIX 2 – Environment Agency Data	23

TABLES & FIGURES

Figure 1 - Site Location.....	3
Figure 2 - IDB Area	4
Figure 3 - IDB Managed Watercourses	4
Figure 4 - Bedford Borough Council SFRA Historic Flood Outlines	7
Figure 5 - Environment Agency Flood Zones	8
Figure 6 - Bedford Borough Council SFRA Flood Zones	8
Table 1 - Environment Agency Flood Zones and Appropriate Land Use	9
Table 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility'	10
Table 3 - Peak River Flow Allowances by River Basin District (use 1961 to 1990 baseline)	10
Table 4 - Modelled Flood Levels (mAOD).....	11
Figure 7 - Environment Agency Model Nodes	11
Figure 8 - Environment Agency Defended Model Flood Outlines	12
Figure 9 - Environment Agency Defended Climate Change Model Flood Outlines	12
Figure 10 - Environment Agency Surface Water Flood Map	14
Figure 11 - Environment Agency Reservoir Flood Map	15
Table 5 - Risk Posed by Flooding Sources	16

EXECUTIVE SUMMARY

The Site would be expected to remain dry in all but the most extreme conditions. Risk management measures are already in place therefore, the flood risk from all sources would be minimised, the consequences of flooding are acceptable and the development would be in accordance with the requirements of the NPPF.

This FRA demonstrates that the proposed development would be operated with medium risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

1.0 INTRODUCTION

1.1 Background

This Flood Risk Assessment (FRA) has been prepared by KRS Environmental Limited at the request of Axis for the proposed development at Stewartby Rail Sidings, Stewartby, Bedford, MK43 9LY. This FRA includes an assessment of the existing and proposed surface water drainage of the Site.

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)¹, associated Planning Practice Guidance on flood risk and coastal change² (PPG) and the PPG 'Site-specific flood risk assessment checklist (para 068 Reference ID: 7-068-20140306. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 National Planning Policy Framework (NPPF)

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall. A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary, provide the evidence to the Local Planning Authority (LPA) that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

¹ Ministry for Housing, Communities and Local Government (2021) National Planning Policy Framework: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

² Communities and Local Government (2014) Planning Practice Guidance - Flood Risk and Coastal Change: <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

1.3 Report Structure

This FRA has the following report structure:

- Section 2 describes the location area and the existing and proposed development;
- Section 3 outlines the flood risk to the existing and proposed development;
- Section 4 details the proposed surface water drainage for the Site and assesses the potential impacts of the proposed development on surface water drainage;
- Section 5 details the sequential and exception tests; and
- Section 6 presents a summary and conclusions.

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The Site is located at Stewartby Rail Sidings, Stewartby, Bedford. The nearest postcode is MK43 9LY, with the National Grid Reference at the entrance of Site being 501072, 242681.

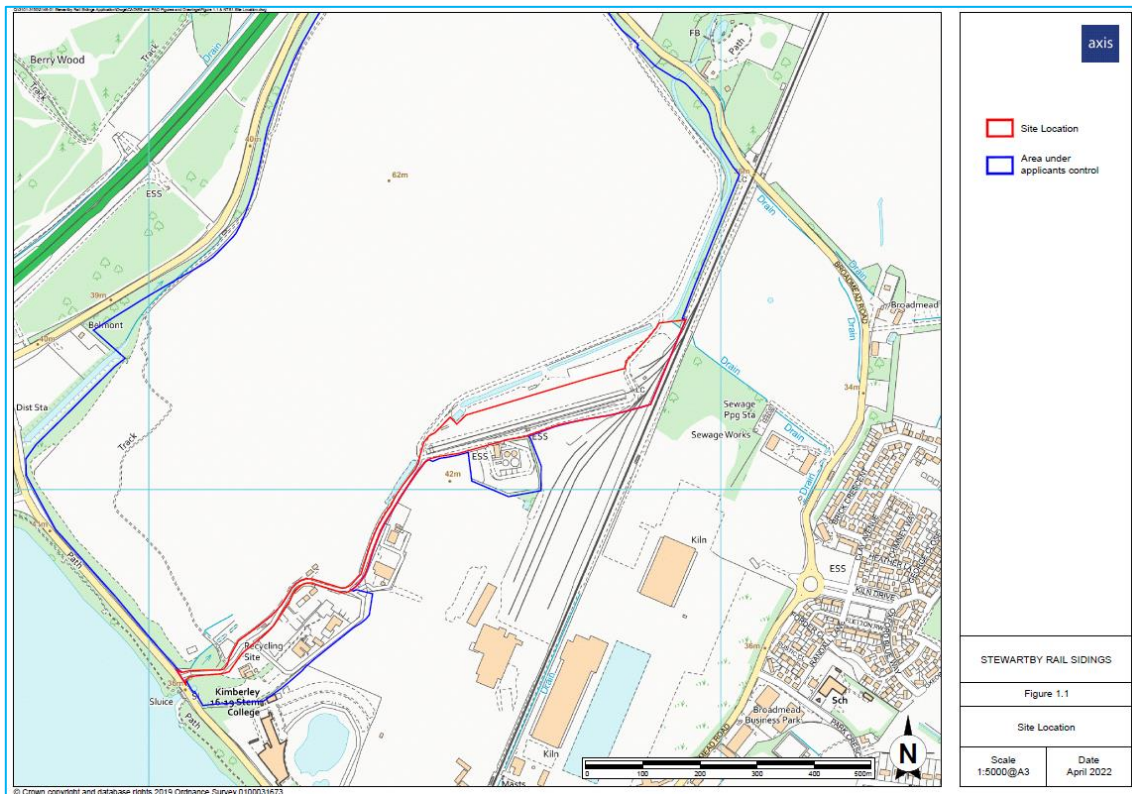


Figure 1 - Site Location

2.2 Existing Development

The Site comprises the existing railway sidings and hardstanding.

2.3 Proposed Development

This planning application seeks consent to use the sidings on a permanent basis and erection of additional weighbridge and wheelwash (see Appendix 1). The sidings are already in situ.

2.4 Ground Levels

The Site falls from south west to north east with a ground level of 36.40 metres Above Ordnance Datum (mAOD) at the entrance of the Site to the south west. The ground levels rise along the access road to 36.90mAOD before falling at the location of the rail sidings. Ground levels at the location of the rail sidings are between 35.68mAOD and 35.97mAOD.

2.5 Catchment Hydrology/Drainage

Stewartby Lake lies to the west directly adjacent to the entrance of the Site. There are numerous unnamed ponds located around the Site. There is an unnamed watercourse to the north of the Site

which flows in a north westerly direction. The Site is located within the Bedfordshire & River Ivel Internal Drainage Board (IDB) (see Figures 2 and 3).

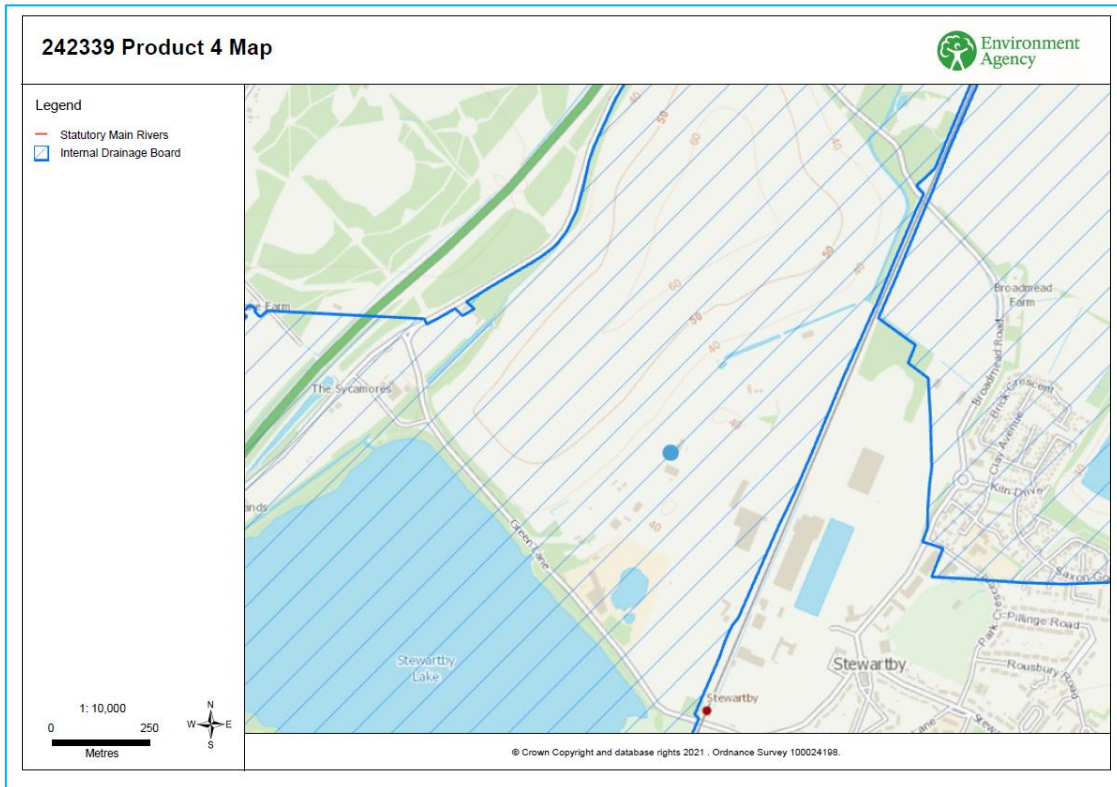


Figure 2 - IDB Area

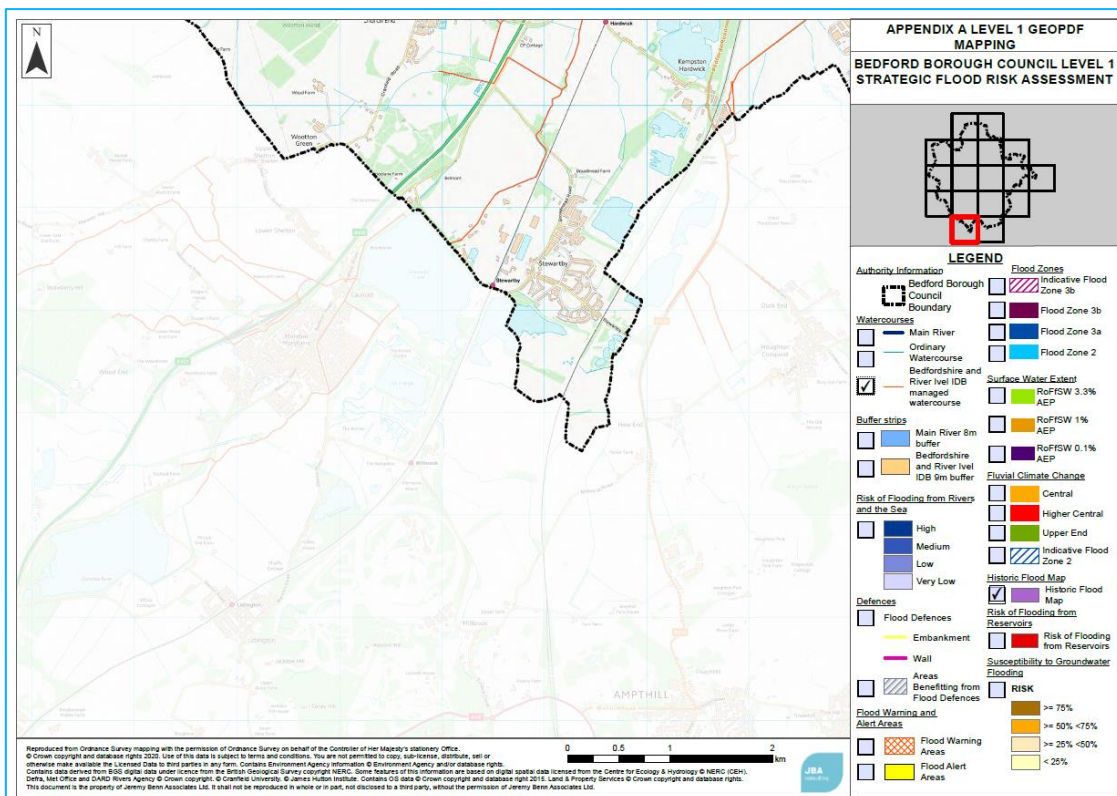


Figure 3 - IDB Managed Watercourses

2.6 Ground Conditions

The British Geological Survey (BGS)³ map shows that no superficial deposits are recorded underlying the Site. The bedrock deposits consist of Kellaways and Oxford clay formation - mudstone, siltstone and sandstone. Sedimentary bedrock formed approximately 156 to 165 million years ago in the Jurassic period with local environment previously dominated by shallow seas. Information from the National Soil Resource Institute⁴ details the Site area as being situated on lime-rich loamy and clayey soils with impeded drainage.

³ <https://mapapps.bgs.ac.uk/geologyofbritain/home.html>

⁴ <https://www.landis.org.uk/soilscapes/>

3.0 FLOOD RISK

3.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

3.2 Environment Agency

Information regarding the current flood risk at the Site and local flood defences has been obtained from the Environment Agency (see Appendix 2).

3.3 Bedfordshire & River Ivel IDB

Through the operation, maintenance and improvement of watercourses and other water control assets within the District, the Bedfordshire & River Ivel IDB seeks to achieve a general standard of water level management that enables the drainage and irrigation of agricultural land, reduces flood risk to developed areas, and sustains environmental features throughout the District.

3.4 Bedford Borough Council

Bedford Borough Council is the LPA and Lead Local Flood Authority (LLFA). The Bedford Borough Council Strategic Flood Risk Assessment (SFRA) which covers the Site has been reviewed.

3.5 Historic Flooding

Environment Agency data and the Bedford Borough Council SFRA (see Figure 4) show that the Site has not historically flooded. There are no records of anecdotal information of flooding at the Site including within the British Hydrological Society "Chronology of British Hydrological Events". No other historical records of flooding for the Site have been recorded. Therefore, it has been concluded that the Site has not flooded within the recent past.

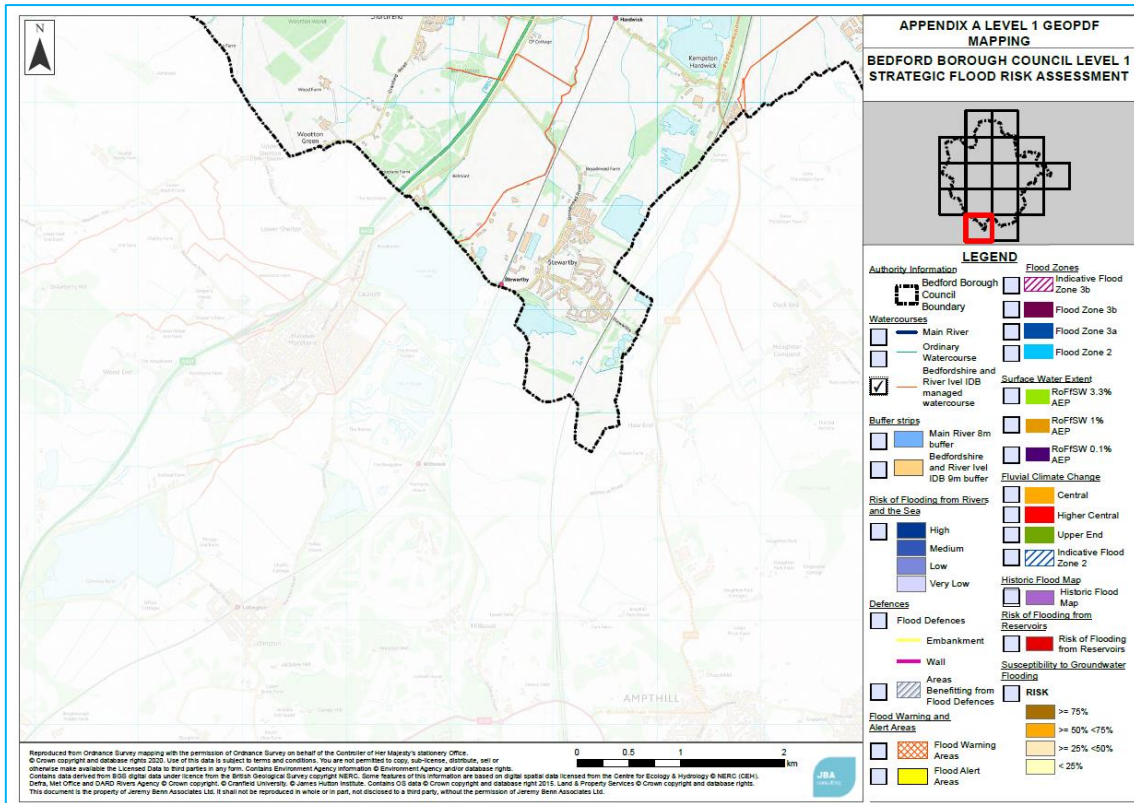


Figure 4 - Bedford Borough Council SFRA Historic Flood Outlines

3.6 Existing and Planned Flood Defence Measures

Environment Agency data confirms that the Site is not protected against flooding by existing flood defence measures (see Figure 5).

3.7 Environment Agency Flood Zones

A review of the Environment Agency’s Flood Zones indicates that the majority of the Site is located within Flood Zone 2 and therefore has a ‘medium probability’ of flooding as shown in Figure 5, with between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. However, a small proportion of the Site is located within Flood Zone 3 and therefore has a ‘high probability’ of flooding with a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

The Bedford Borough Council SFRA shows that the Site is located within Flood Zone 3a and not Flood Zone 3b: ‘Functional Floodplain’ (see Figure 6). The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. They show the worst-case scenario.

The Environment Agency Flood Zones and acceptable development types are explained in Table 1. Table 1 shows that some development types are generally acceptable in Flood Zones 2 and 3a.

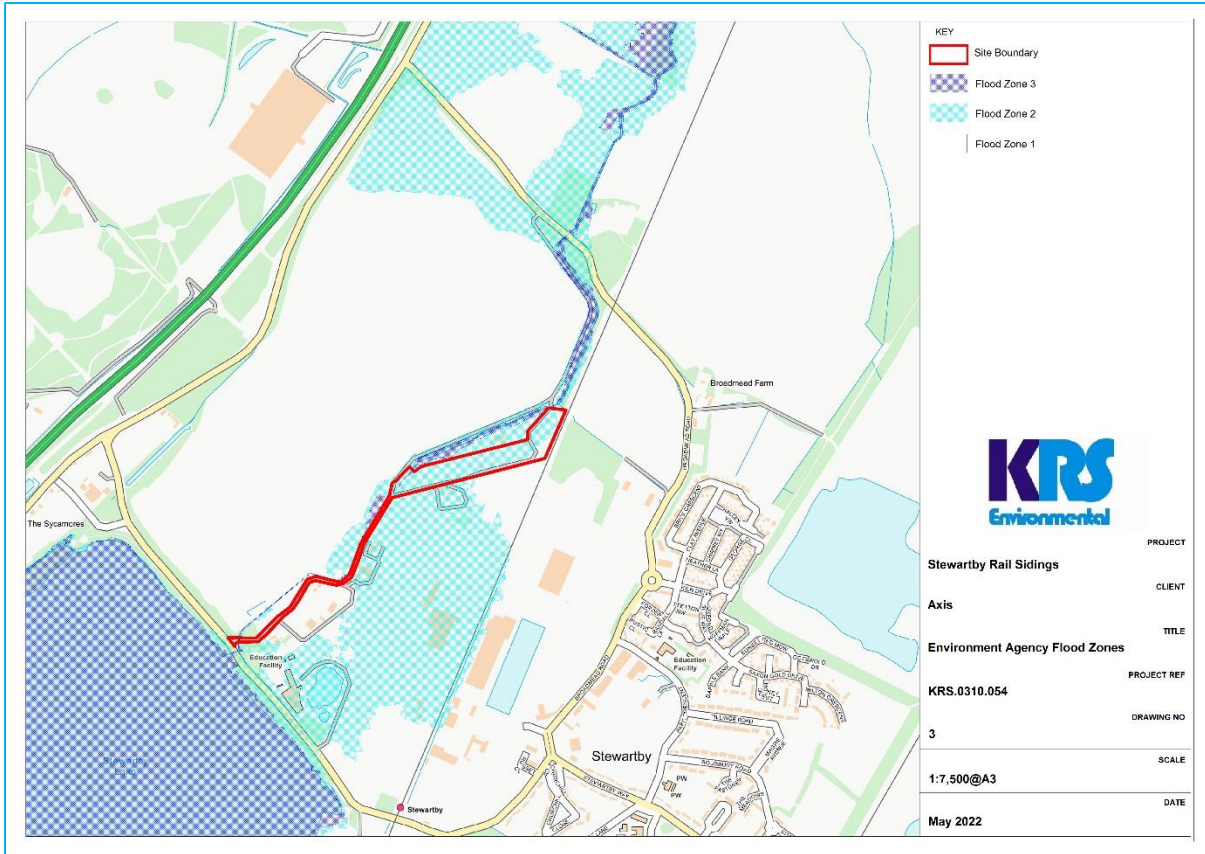


Figure 5 - Environment Agency Flood Zones

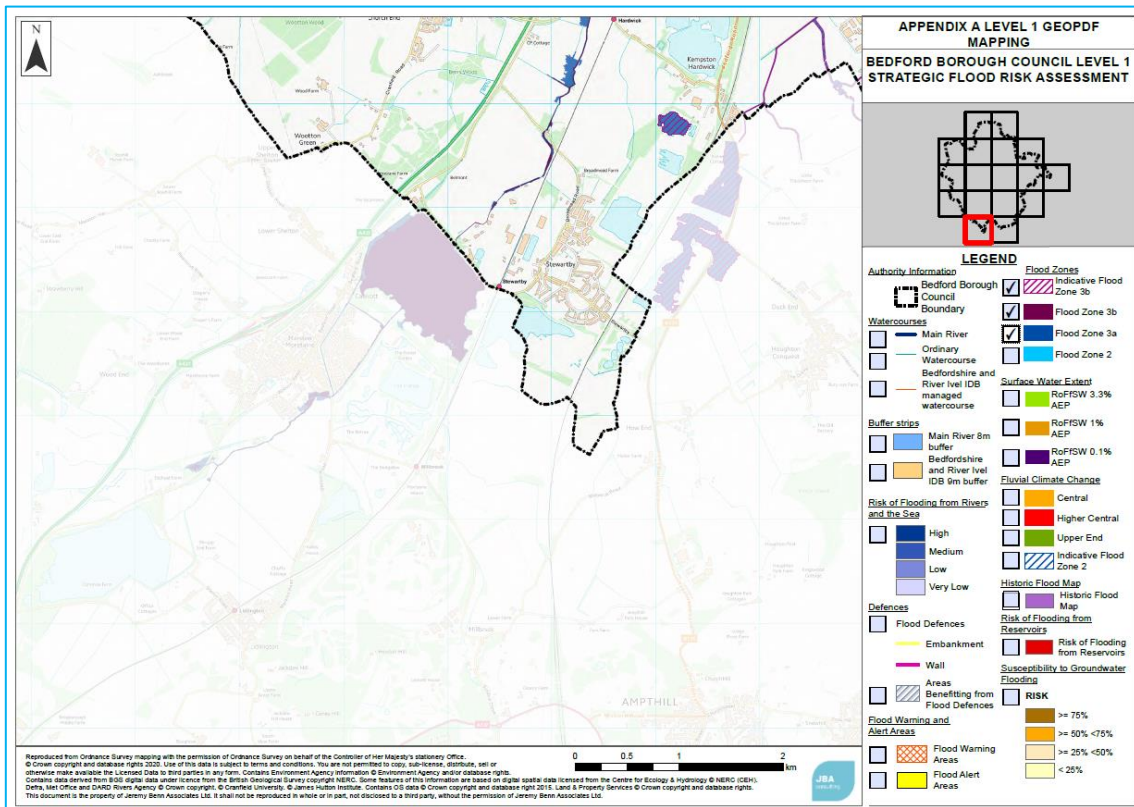


Figure 6 - Bedford Borough Council SFRA Flood Zones

Table 1 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	Some development types not acceptable
Zone 3b	'Functional Floodplain'	Land where water has to be flow or be stored in times of flood. SFRA's should identify this zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes)	Some development types not acceptable

3.8 Flood Vulnerability

In the Planning Practice Guidance to the NPPF, appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the Planning Practice Guidance to the NPPF, the existing and proposed use is classified as 'less vulnerable'.

The NPPF does not explicitly define the flood risk vulnerability of rail sidings. Table 2 of the Planning Practice Guidance to the NPPF provides the Flood Risk vulnerability classification for different development types. It is considered that the proposed development would most closely align with general industry, storage and distribution. This confirms that general industry, storage and distribution are 'less vulnerable' uses. This planning application seeks consent to use the sidings on a permanent basis. The sidings are already in situ and the only development proposed is for a weighbridge and wheelwash. Essential transport infrastructure (including mass evacuation routes) area described as 'essential infrastructure' however, the Proposed Development is not for an essential transport infrastructure.

Recent planning applications for rail sidings have been classified as 'less vulnerable' such as the proposed aggregates rail depot land at Neilson's Sidings, Ise Valley Industrial Estate, Finedon Road, Wellingborough, Northamptonshire. (ref: 08/00073/MIN) Renwick Road Rail Hub. Table 2 of this report and the Planning Practice Guidance to the NPPF states that 'less vulnerable' uses are appropriate within Flood Zones 2 and 3a after the completion of a satisfactory FRA.

It is proposed to continue to use the railway sidings, the proposed development will not change the vulnerability of the Site and will not introduce 'more vulnerable' developments into the floodplain.

Table 2 - Flood Risk Vulnerability and Flood Zone ‘Compatibility’

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
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.

3.9 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA throughout the lifetime of the proposed development. The lifetime of residential developments is taken as 100 years, commercial/industrial developments is taken as 60 years and other development types can be justified on a case by case basis. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance⁵.

Table 3 shows peak river flow allowances by river basin district. The flood risk assessments: climate change allowances guidance recommends that for ‘less vulnerable’ uses in Flood Zones 2 and 3a that the central allowances are used. Therefore, the design event for the Site is the 1 in 100 year (+19%) event.

Table 3 - Peak River Flow Allowances by River Basin District (use 1961 to 1990 baseline)

River Basin District	Allowance Category	2020s	2050s	2080s
Upper and Bedford Ouse Management Catchment	Upper	+24%	+30%	+58%
	Higher	+10%	+11%	+30%
	Central	+5%	+4%	+19%

3.10 Fluvial (river) Flooding

Fluvial flooding from the unnamed watercourse poses the primary flood risk to the site. Table 4 shows the Environment Agency fluvial water levels for the site and the model nodes are shown in Figure 7. The Environment Agency modelled flood outlines are shown in Figures 8 to 9. The modelled water levels have been compared to the ground level of the site and areas within the vicinity of the site to assess the flood risk at the site in detail.

⁵ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances>

Table 4 - Modelled Flood Levels (mAOD)

Node Label	Easting	Northing	Return Period (years)									
			5	10	20	25	50	75	100	200	1000	100 (+20%)
EA0522993241	501074	242651	35.16	35.22	35.29	35.3	35.39	35.46	35.51	35.66	36.42	35.68
EA0522993242	501416	242974	34.12	34.28	34.49	34.52	34.75	34.90	35.20	35.30	36.20	35.34
EA0522993247	501576	243159	34.04	34.21	34.44	34.47	34.71	34.87	34.99	35.28	36.19	35.32
EA0522993248	501635	243182	34.02	34.20	34.43	34.46	34.71	34.86	34.98	35.28	36.19	35.32
EA0522993251	501689	243202	34.01	34.19	34.42	34.46	34.70	34.86	34.98	35.28	36.19	35.31
EA0522993256	501821	243260	33.67	33.80	33.96	33.99	34.15	34.25	34.33	34.51	35.64	34.54
EA0522993259	501910	243295	33.34	33.41	33.47	33.49	33.56	33.60	33.63	33.69	34.24	33.70

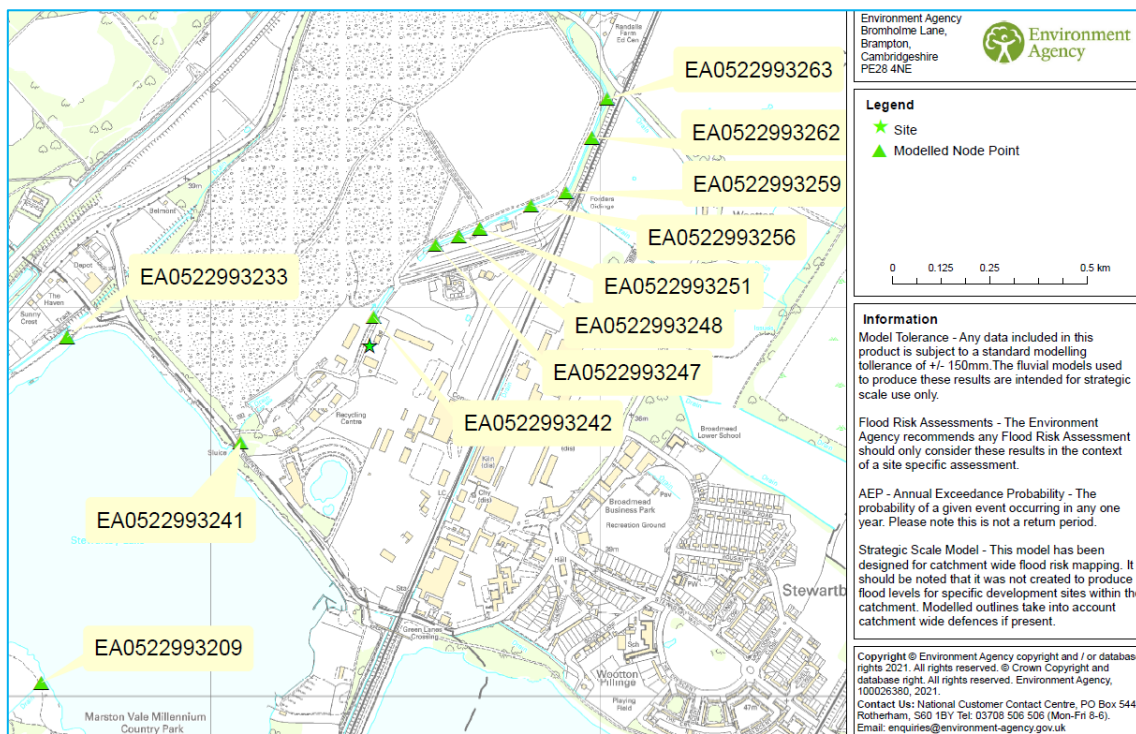


Figure 7 - Environment Agency Model Nodes

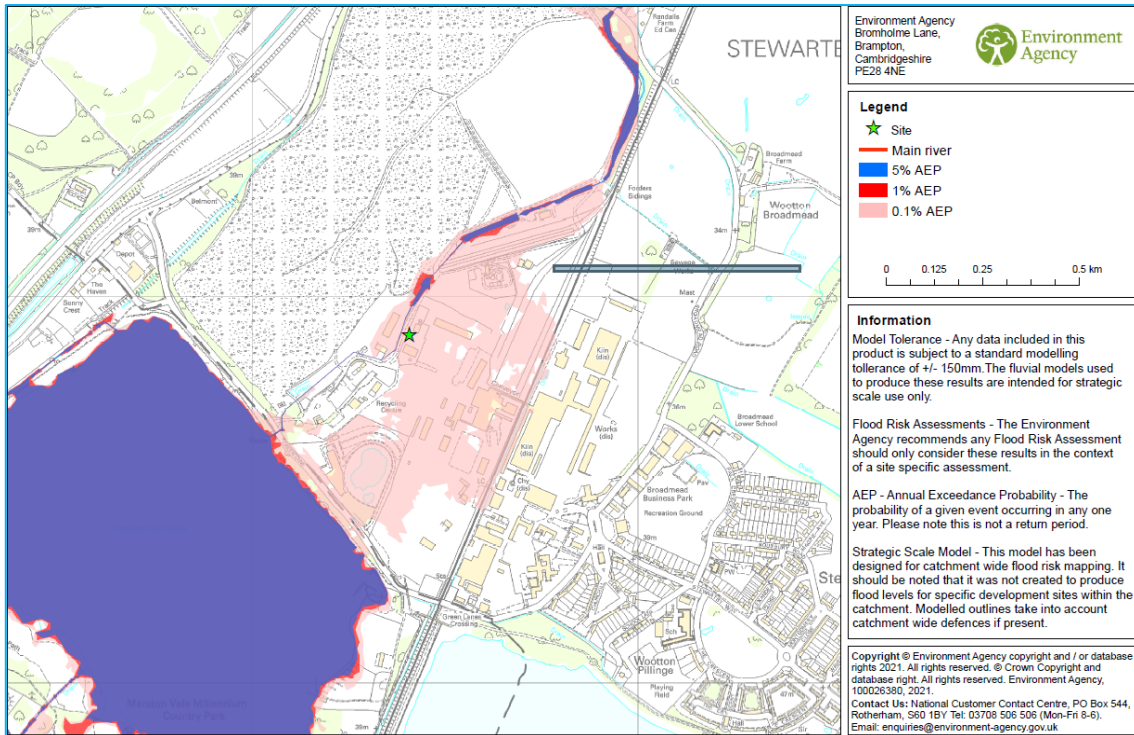


Figure 8 - Environment Agency Defended Model Flood Outlines

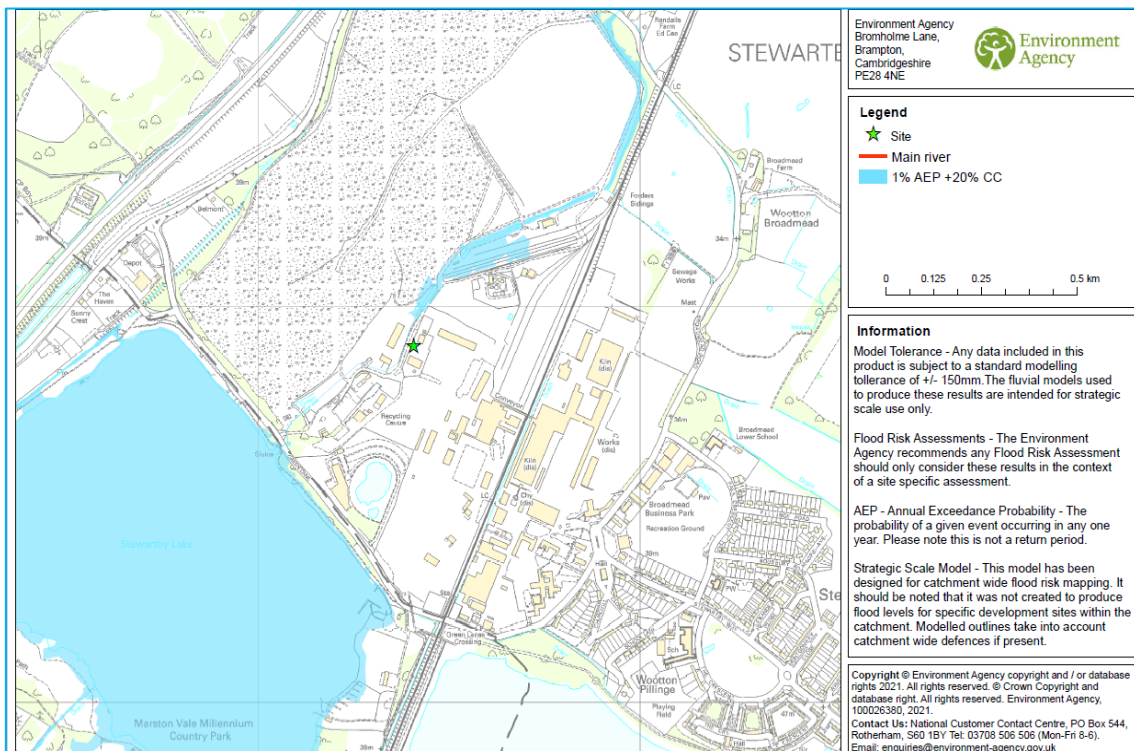


Figure 9 - Environment Agency Defended Climate Change Model Flood Outlines

Water levels have been modelled at the entrance of the Site (node: EA0522993241), at 35.68mAOD during the 1 in 100 year (+20%) event. The ground level at the Site entrance is a minimum of 36.41mAOD therefore, the Site Entrance will not be inundated with floodwater for all events up to and including the 1 in 100 year (+20%) event. Water levels have been modelled at the entrance of the

Site (node: EA0522993241), at 36.42mAOD during the 1 in 1000 year event. Therefore, during the 1 in 1000 year event the Site entrance may be inundated with floodwater to a depth of 0.02m.

Water levels have been modelled at the rail sidings (node: EA0522993247 to EA0522993251), at 35.32mAOD during the 1 in 100 year (+20%) event. The ground level at the rail sidings is a minimum of 35.68mAOD therefore, the rail siding will not be inundated with floodwater for all events up to and including the 1 in 100 year (+20%) event. Water levels have been modelled at the rail sidings (node: EA0522993247 to EA0522993251), at 36.19mAOD during the 1 in 1000 year event. Therefore, during the 1 in 1000 year event the rail sidings may be inundated with floodwater to a depth of 0.51m.

The site is one of the last places in the area to flood and remains flood free when other areas close by are flooded. The site is at such a ground level that it would only flood in the most extreme flood events; the site will remain flood free for the vast majority of flood events during the lifetime of the proposed development.

The likelihood of a rapid river level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal. Any flooding would be of a minor nature due to the low flows and topography of the area. The flooding will only inundate the area to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases.

Given the small scale and nature of the proposed development, i.e. no change to the existing use, and the size and location of the fluvial flooding sources it has been concluded that the risk of fluvial flooding is considered to be of **low significance**.

3.11 Tidal (coastal) Flooding

The Site is not located within the vicinity of tidal flooding sources and therefore, the risk of fluvial flooding is considered to be **not significant**.

3.12 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers). Site ground conditions suggest a low potential for groundwater flooding and furthermore, no below ground level buildings and/or structures are proposed. The risk of flooding from groundwater flooding is considered to be **not significant**.

3.13 Surface Water (pluvial) Flooding

The Site is not situated near to large areas of poor permeability which may result in surface water flooding. The Environment Agency Surface Water flood map⁶ shows that the majority of the Site has a very low risk of surface water flooding (see Figure 10) with a chance of flooding of less than 1 in 1000 (0.1%) years. A very small area of the Site is shown to have a high risk of surface water flooding with a chance of flooding greater than 1 in 30 (3.3%) years at an approximate flooding depth of less than 900mm. This is associated with a low isolated spot on the Site.

⁶ <https://check-long-term-flood-risk.service.gov.uk/map>

Given the small scale and nature of the proposed development, i.e. no change to the existing use, and the size and location of the surface water flooding sources it has been concluded that the risk of surface water flooding is considered to be of **low significance**.



Figure 10 - Environment Agency Surface Water Flood Map

3.14 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

Any existing sewers located within the vicinity of the site and these will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment.

Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years.

The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, the risk of flooding from sewer flooding is considered to be **not significant**.

3.15 Flooding from Artificial Drainage Systems/Infrastructure Failure

The Environment Agency Reservoir flood map shows that the site is at risk of reservoir flooding from Stewartby Lake (see Figure 11). Reservoir flooding is extremely unlikely; reservoirs in the UK have a very good safety record. There has been no loss of life in the UK from reservoir flooding since 1925.

Since then reservoir safety legislation has been introduced to make sure reservoirs are well maintained. The hazard is well managed through effective legislation and it is unlikely that the impact zone downstream of the reservoirs should preclude the proposed development. The risk of flooding from artificial drainage systems/infrastructure failure is considered to be **not significant**.

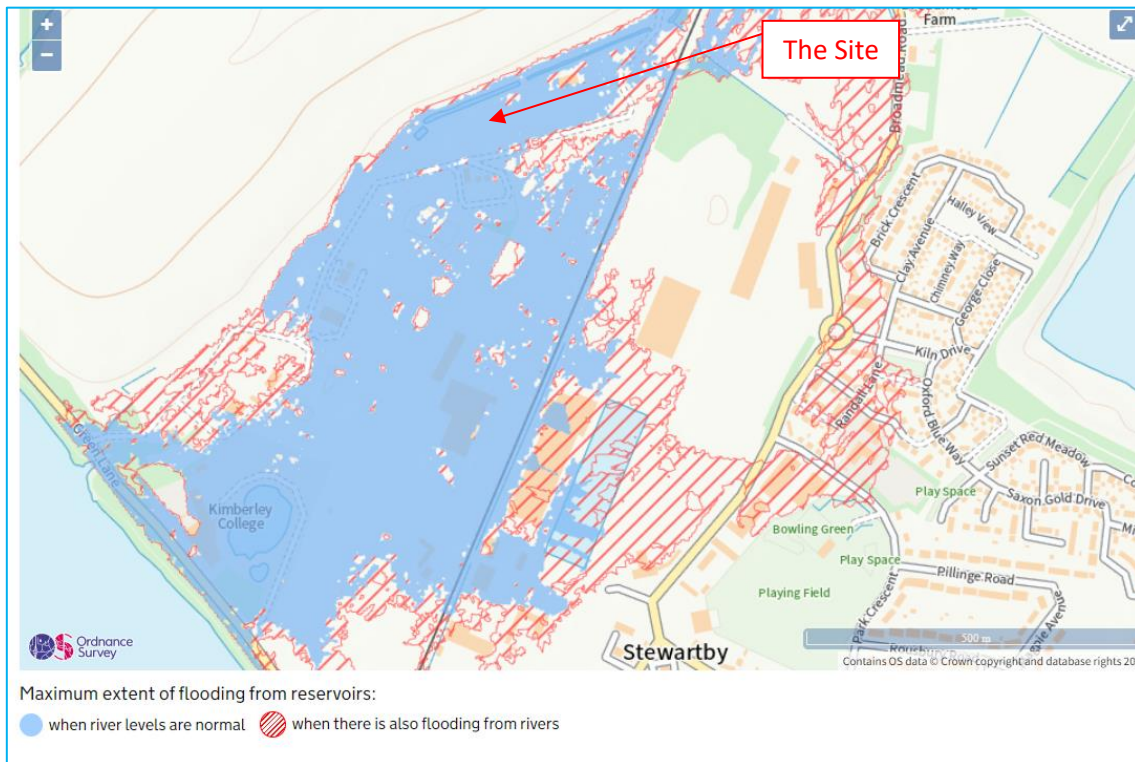


Figure 11 - Environment Agency Reservoir Flood Map

3.16 Effect of the Development on Flood Risk

The development is existing and no alterations to the development are proposed therefore there will be no impact on flood risk and the overall direction of the movement of water will be maintained within the developed Site and surrounding area. There will no net loss in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered; therefore, the overland flow routes will not be altered.

3.17 Summary of Site Specific Flood Risk Assessment

A summary of the sources of flooding and a review of the risk posed by each source at the Site is shown in Table 5.

Fluvial flooding from the unnamed watercourse poses the primary flood risk to the Site. The majority of the Site is located within Flood Zone 2 and therefore has a 'medium probability' of flooding, with between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. However, a small proportion of the Site is located within Flood Zone 3 and therefore has a 'high probability' of flooding with a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

The existing and proposed use is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zones 2 and 3 after the completion of a satisfactory FRA. It is proposed to continue to use the railway sidings on a permanent basis therefore, the proposed development will not change the vulnerability of the Site and will not introduce 'more vulnerable' developments into the floodplain.

The Site will not be inundated with floodwater for all events up to and including the 1 in 100 year (+20%) event therefore, the Site will be flood free during the 1 in 100 year (+19%) event which is the design event for the Site.

During the 1 in 1000 year event the rail sidings may be inundated with floodwater to a depth of 0.51m and the Site entrance may be inundated with floodwater to a depth of 0.02m. Given the small scale and nature of the proposed development, i.e. no change to the existing use, and the size and location of the fluvial flooding sources it has been concluded that the risk of fluvial flooding is considered to be of **low significance**. A secondary flooding source has been identified which may pose a **low significant** risk to the Site. This is:

- Surface Water Flooding

The flooding source will only inundate the Site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development Site.

The development is existing and no alterations to the development are proposed therefore there will be no impact on flood risk and the overall direction of the movement of water will be maintained within the developed Site and surrounding area. There will no net loss in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered; therefore, the overland flow routes will not be altered.

Table 5 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial Flooding	Yes	Unnamed watercourse	Low
Tidal Flooding	No	None Reported	None
Groundwater Flooding	No	None Reported	None
Surface Water Flooding	Yes	Low Spots	Low
Sewer Flooding	No	None Reported	None
Flooding from Artificial Drainage Systems/Infrastructure Failure	Yes	Reservoirs	None

4.0 SURFACE WATER DRAINAGE

4.1 Surface Water Management Overview

It is recognised that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the Site. Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage.

An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the Site. The assessment considers the impact of the proposals compared to current conditions. Therefore, the surface water attenuation requirement for the developed Site can be determined and reviewed against existing arrangements.

The requirement for managing surface water runoff from developments depends on the pre-developed nature of the Site. If it is an undeveloped greenfield Site, then the impact of the proposals will need to be mitigated so that the runoff from the Site replicates the natural drainage characteristics of the pre-developed Site. The surface water drainage arrangements for any Site should be such that the volumes and peak flow rates of surface water leaving a Site are no greater than the rates prior to the proposed development unless specific off-Site arrangements are made and result in the same net effect.

It should be acknowledged that the satisfactory collection, control and discharge of surface water runoff are now a principle planning and design consideration.

4.2 Surface Water Runoff Rate / Volume

The built development is existing and the only proposed alterations to the development are for the construction of a weighbridge and wheelwash. It is understood that the drainage infrastructure at the Site efficiently and effectively manages surface water runoff generated at the site. As there is no history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed Site use.

The amount of impermeable surfaces will not change post-application compared to pre-application. The surface water runoff will not increase post-application compared to pre-application and there will be no increase in surface water flood risk to the site and off-site locations.

5.0 SEQUENTIAL APPROACH

5.1 Sequential / Exception Tests

The risk-based Sequential Test in accordance with the NPPF aims to steer new development to areas at the lowest probability of flooding (i.e. Flood Zone 1). It is impractical to suggest that there are more suitable locations for this development elsewhere. The operation of the sidings will utilise existing infrastructure which has been in place for several decades. This directs the development to this location which is suitably located to allow the importation of material to the local area via the existing sidings.

The site proposals cannot be located in another site elsewhere they have to be located at this Site which has existing facilities. It is proposed to use the railway sidings on a permanent basis. The proposed development will not change the vulnerability of the Site or introduce a new 'more vulnerable' developments into the floodplain. Paragraph 168 of the NPPF confirms that: *'Applications for minor development and changes of use should not be subject to the Sequential or Exception Tests⁷ but should still meet the requirements for site-specific flood risk assessments'*.

The development proposals should therefore be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

⁷ Except for any proposal involving a change of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the Sequential and Exception Tests should be applied as appropriate.

6.0 SUMMARY AND CONCLUSIONS

6.1 Introduction

This report presents a FRA in accordance with the NPPF for the proposed development at Stewartby Rail Sidings, Stewartby, Bedford, MK43 9LY.

This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

6.2 Flood Risk

Fluvial flooding from the unnamed watercourse poses the primary flood risk to the Site. The majority of the Site is located within Flood Zone 2 and therefore has a 'medium probability' of flooding, with between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. However, a small proportion of the Site is located within Flood Zone 3 and therefore has a 'high probability' of flooding with a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

The proposed use is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zones 2 and 3 after the completion of a satisfactory FRA. It is proposed to use the railway sidings on a permanent basis therefore, the proposed development will not change the vulnerability of the Site and will not introduce 'more vulnerable' developments into the floodplain.

The Site will not be inundated with floodwater for all events up to and including the 1 in 100 year (+20%) event therefore, the Site will be flood free during the 1 in 100 year (+19%) event which is the design event for the Site.

During the 1 in 1000 year event the rail sidings may be inundated with floodwater to a depth of 0.51m and the Site entrance may be inundated with floodwater to a depth of 0.02m. Given the small scale and nature of the proposed development, i.e. no change to the existing use, and the size and location of the fluvial flooding sources it has been concluded that the risk of fluvial flooding is considered to be of **low significance**. A secondary flooding source has been identified which may pose a **low significant** risk to the Site. This is:

- Surface Water Flooding

The flooding source will only inundate the Site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development Site.

The development is existing and no alterations to the development are proposed therefore there will be no impact on flood risk and the overall direction of the movement of water will be maintained within the developed Site and surrounding area. There will no net loss in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered; therefore, the overland flow routes will not be altered.

6.3 Surface Water Drainage

The built development is existing and the only proposed alterations to the development are for the construction of a weighbridge and wheelwash. It is understood that the drainage infrastructure at the Site efficiently and effectively manages surface water runoff generated at the site. As there is no

history of surface water flooding at the site it is likely that the current drainage system is sufficient for the current and proposed Site use.

The amount of impermeable surfaces will not change post-application compared to pre-application. The surface water runoff will not increase post-application compared to pre-application and there will be no increase in surface water flood risk to the site and off-site locations.

6.4 Sequential Approach

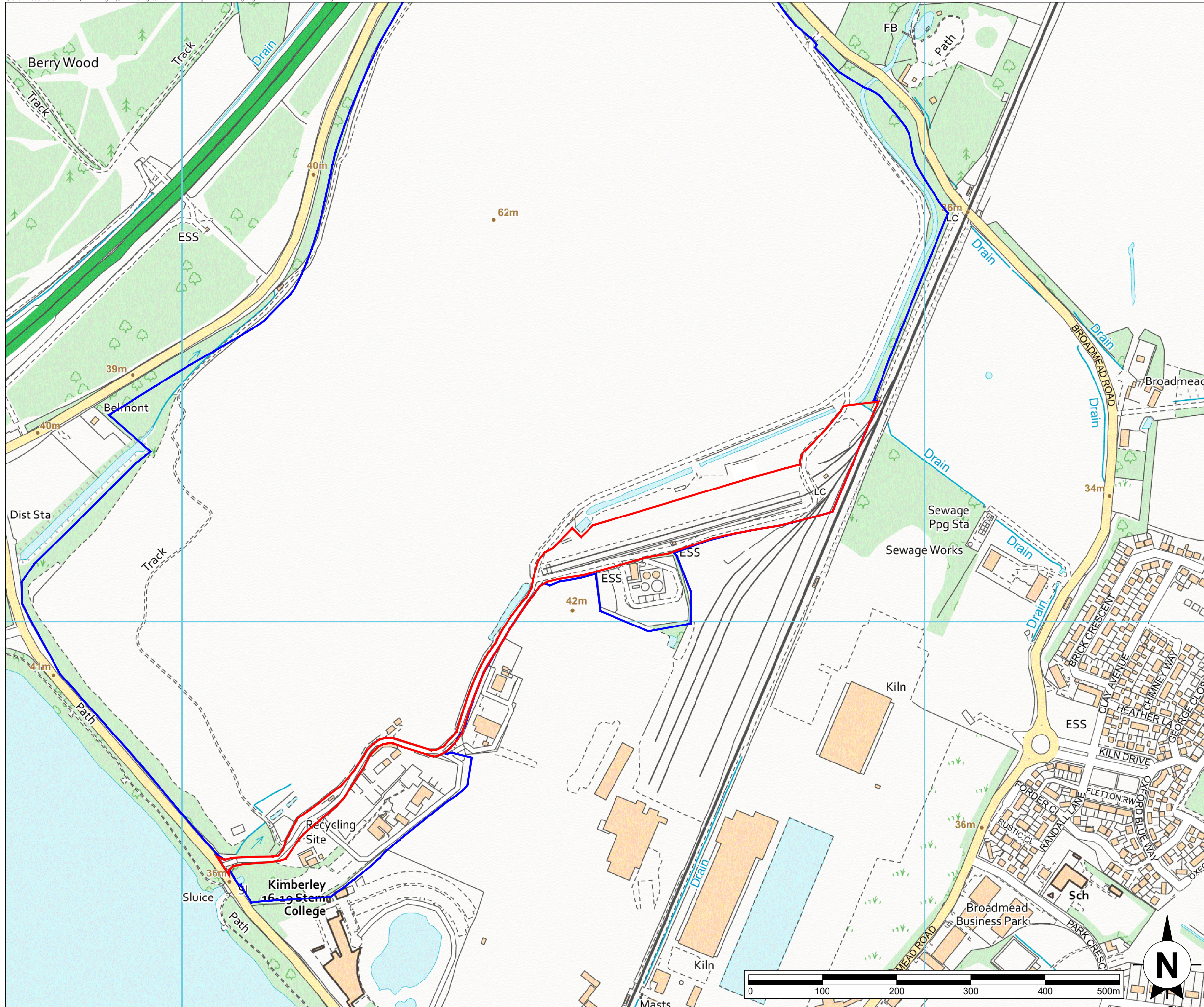
The development proposals should be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

6.5 Conclusion

In conclusion, the Site, would be expected to remain dry in all but the most extreme conditions. Risk management measures are already in place therefore, the flood risk from all sources would be minimised, the consequences of flooding are acceptable and the development would be in accordance with the requirements of the NPPF.

This FRA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

APPENDIX 1 – Site Layouts



- Site Location
- Area under applicants control

STEWARTBY RAIL SIDINGS

Figure 1.1

Site Location

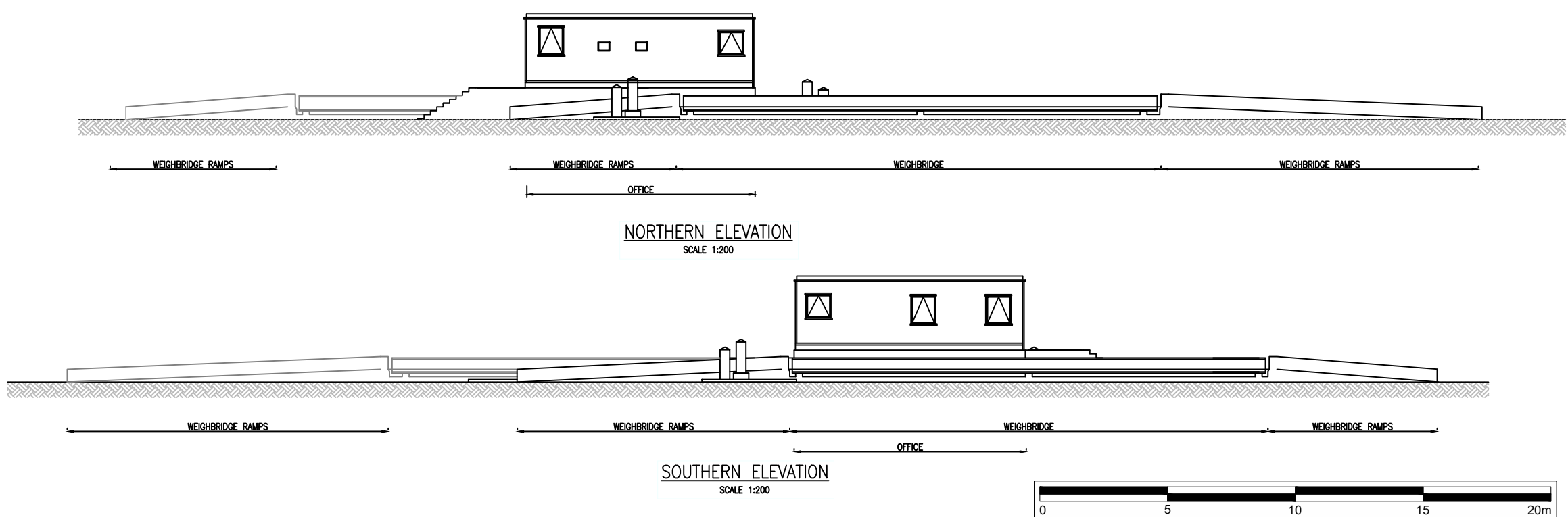
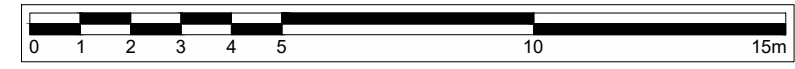
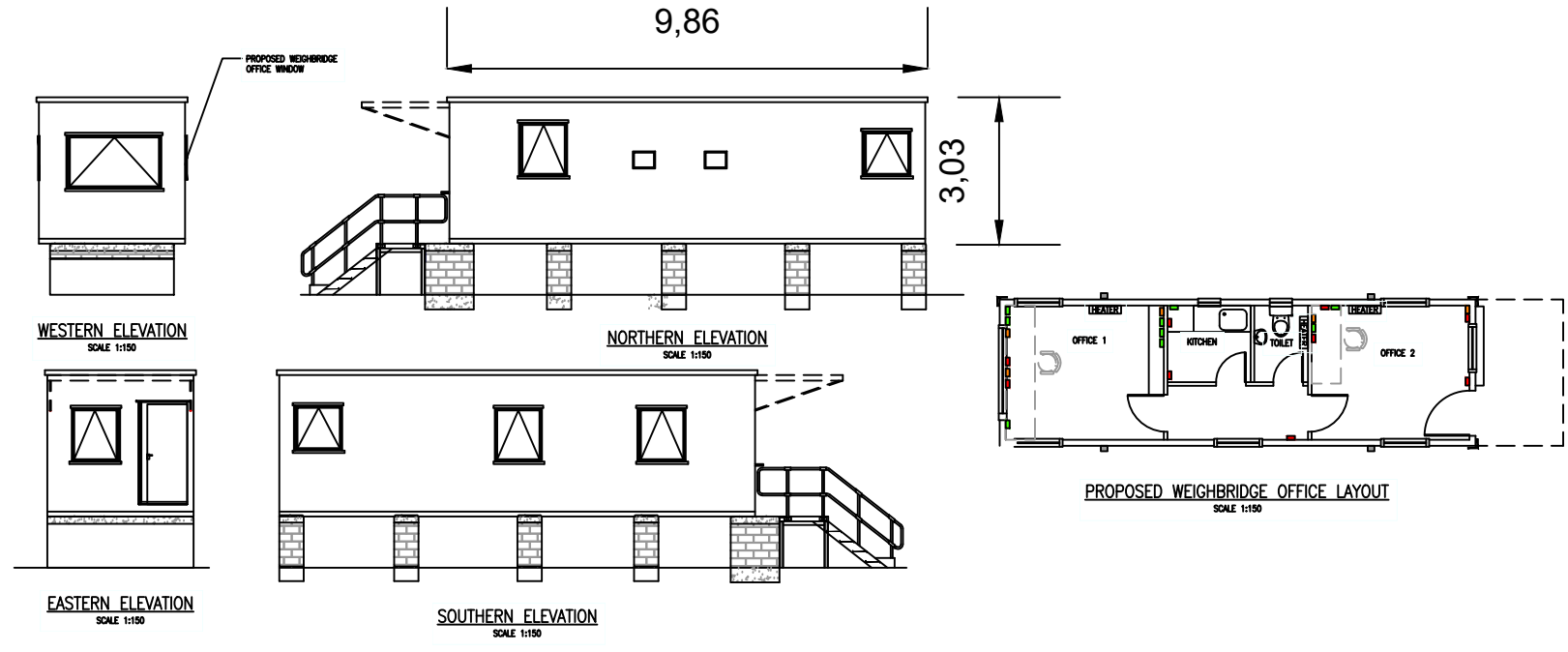
Scale
1:5000@A3

Date
April 2022

This drawing is the copyright of AXIS P.E.D Limited and may not be loaned, copied or reproduced in any way -or used for any offer, quote, tender or construction purposes without written consent of the company to do so
 Follow any figured dimensions - do not scale for construction purposes. IF IN DOUBT ASK.

• Revision History • Date

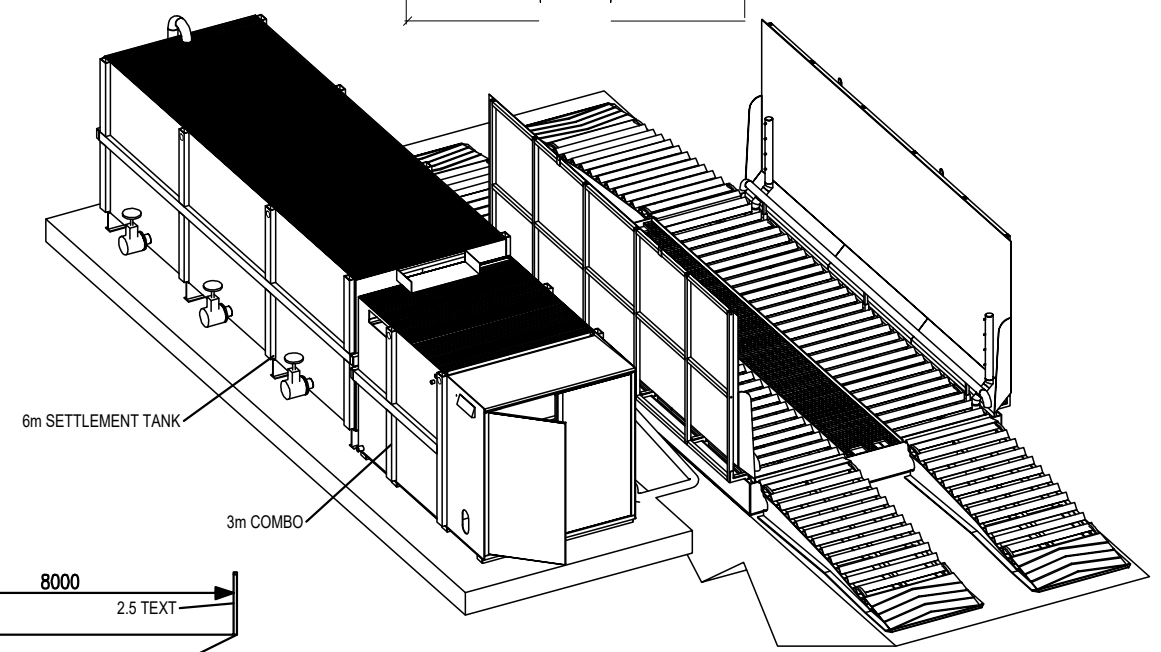
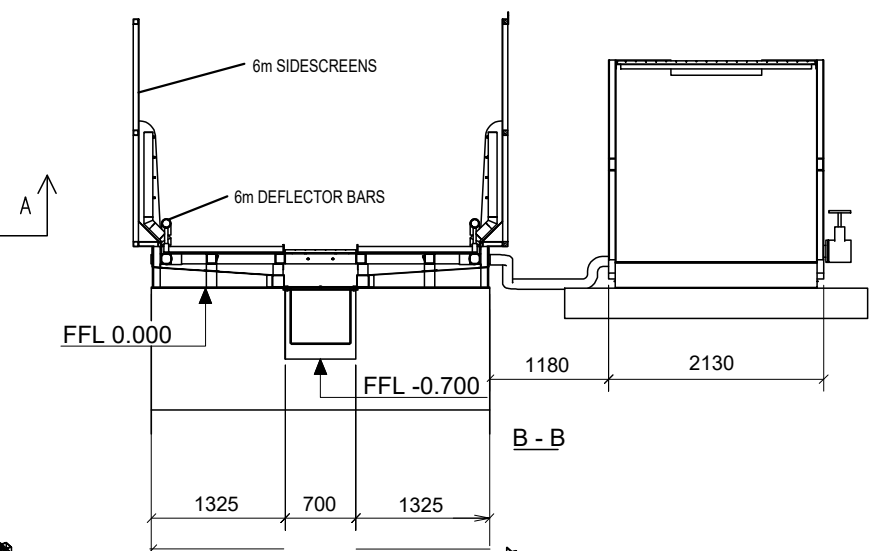
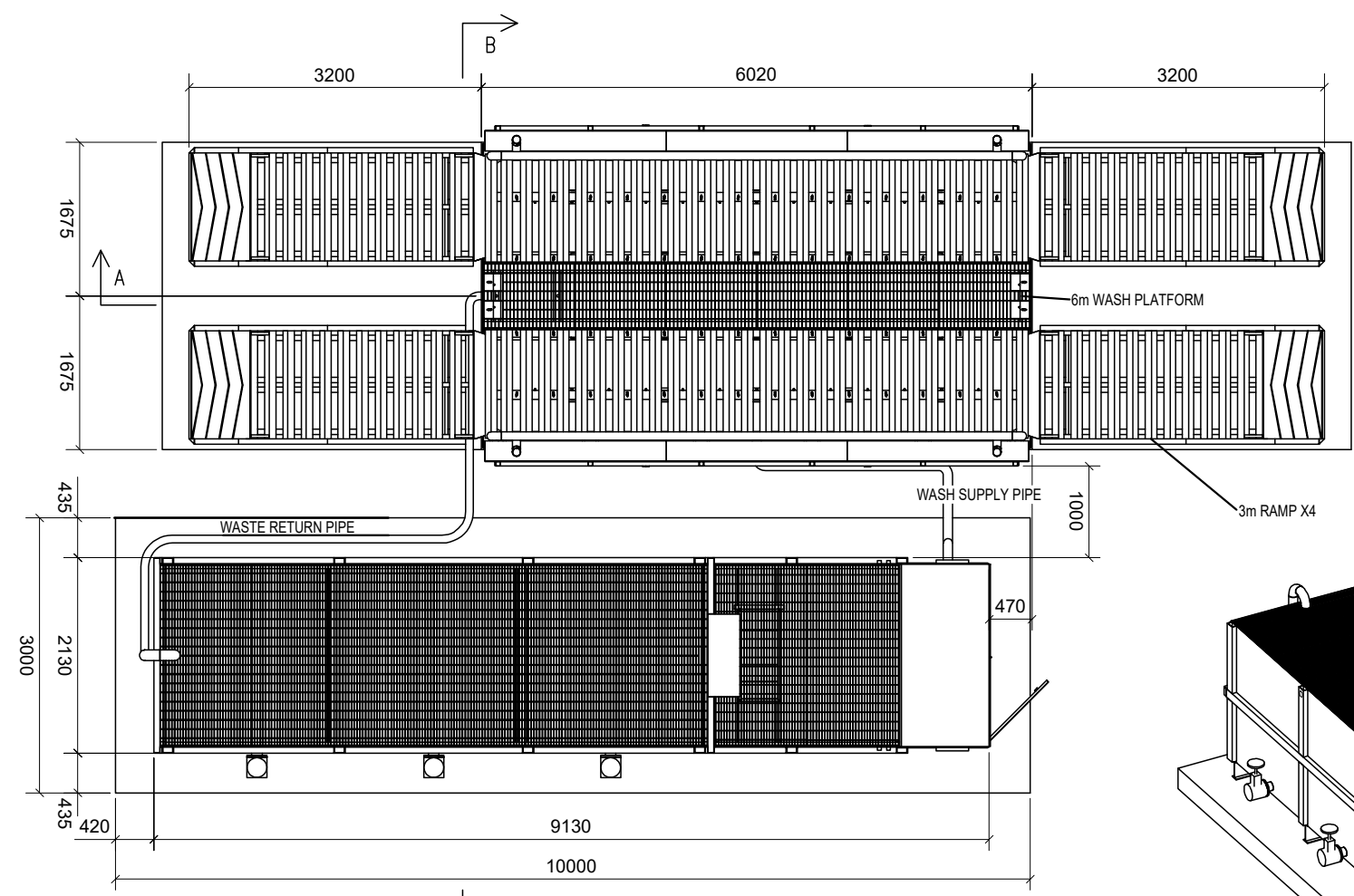
Revision History	Date



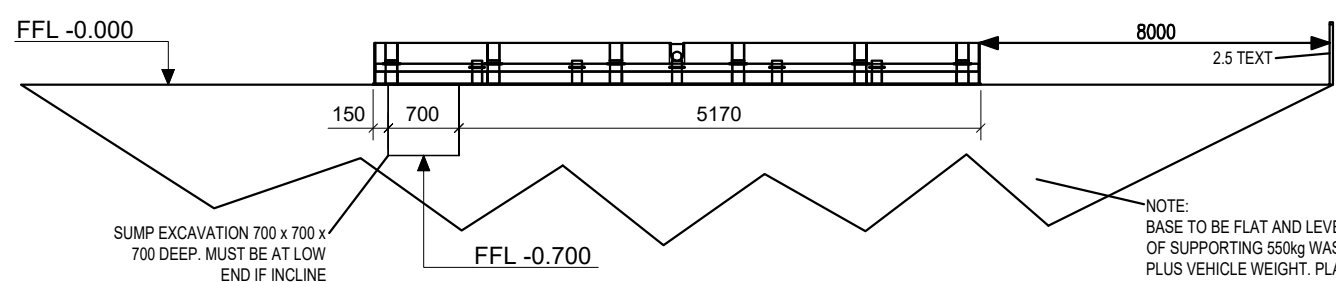
Chester Office: Weighbridge Plans Brighton Chester CH4 6DH	South Manchester Office: Canalside House 74 Water Lane Wilmslow SK9 5BB	axis 0844 8700 007 - www.axisped.co.uk
client: --		
project: STEWARTBY RAIL SIDINGS APPLICATION		
drawing title: WEIGHBRIDGE OFFICE & WEIGHBRIDGE ELEVATIONS		
date: APRIL 2022	drawn by: SK	checked: SH
drawing number: 3146-01-04	status: --	rev: --
scale(s): A5 SHOWN @A3	planning environment design	

This drawing is the copyright of AXIS P.E.D Limited and may not be loaned, copied or reproduced in any way - or used for any offer, quote, tender or construction purposes without written consent of the company to do so
 Follow any figured dimensions - do not scale for construction purposes. IF IN DOUBT ASK.

• Revision History • Date



3d-rendered



NOTE:
 BASE TO BE FLAT AND LEVEL CAPABLE OF SUPPORTING 550kg WASH PLATFORM PLUS VEHICLE WEIGHT. PLATFORM HAS NO POINT LOADING MAX. PERM GRADIENT 1:30

A - A

REV NO	REV MARK	REVISION DESCRIPTION	REVISION DATE
HIPPOWASH			
PROJECT	INSTALLATION DETAILS		
CLIENT	TYPICAL ARRANGEMENT		
TITLE	A3_GA_DRAWING		
DRAWN BY:	CHECKED BY:	ISSUE DATE:	CONTRACT No: DWG No: REV No:
N.C.		0	G[1]

Hippohire Ltd
 Unit One, The Red Lion, Barony Road, Nantwich CW5 5QS
 Tel +44 (01270) 252 669



Chester Office: Well House Farm Brinton Chester CH4 8DH	South Manchester Office: Canella House 74 Water Lane Wilmslow SK9 6BB	axis
client: --		
project: STEWARTBY RAIL SIDINGS APPLICATION		
drawing title: WHEELWASH ELEVATIONS		
date: APRIL 2022 drawing number: 3146-01-05 scale(s): 1:75 @A3	drawn by: SK status: -- rev: --	checked: SH
planning environment design		

APPENDIX 2 – Environment Agency Data

Ruth Evans

Our ref

EAn/2021/242339

Ruth@krsenvironmental.com

Date

03 December 2021

Dear Ruth

Enquiry regarding Product 4 for Land at Stewartby, Bedford, MK43 9LY

Thank you for your enquiry which was received on 24 December 2021.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The information we hold and a copy of the Flood Risk Assessment (FRA) advisory note is attached to my email.

Further Asset Management Data and Information can be found online using this link: <https://environment.data.gov.uk/asset-management/index.html>

There are no specific Environment Agency flood defences at this location.

The site sits close to Bedfordshire and River Ivel Internal Drainage Board, the IDB may be able to offer further information and can be contacted via email at: contact@idb.gov.uk

We attach a map to aid you in your enquiry.

Name	Product 4
Description	Detailed Flood Risk Assessment Map for <i>Land at Stewartby, Bedford, MK43 9LY</i>
Licence	Open Government Licence
Information Warnings	The maps provided are to be used in conjunction with the Datasheet . Please read the Datasheet and take note of information contained within the ' Important Information ' section.
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>

East Anglia Area

Ipswich Office, Icen House, Cobham Road, Ipswich, Suffolk, IP3 9JD
 Bampton Office, Bromholme Lane, Bampton, Huntingdon, PE28 4NE
 General Enquiries: 03708 506506
 Email: enquiries@environment-agency.gov.uk
 Website: <https://www.gov.uk/government/organisations/environment-agency>



INVESTOR IN PEOPLE



Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.
-------------	---

Flood Map for Planning (Rivers and Sea)

The Flood Map for Planning (Rivers and Sea) can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-map-for-planning.service.gov.uk>

Long Term Flood Risk Information

Long term flood risk mapping including: *Risk of Flooding from Rivers or the Sea*, *Flood Risk from Surface Water* and *Flood Risk from Reservoirs* can be viewed on GOV.UK: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

Climate Change Allowances

The National Planning Practice Guidance refers planners, developers and advisors to the Environment Agency's guidance on considering climate change in Flood Risk Assessments (FRAs). This guidance was updated in October 2021 and is available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

The guidance provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, which varies depending on which management catchment a site lies within. It advises on which allowances to use for assessing the impact of climate change on fluvial flood risk based on vulnerability classification, flood zone and development lifetime.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#))
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

What's In Your BackYard (WIYBY) is no longer available

Most of the data is still available via other sharing services such as [DATA.GOV.UK](#), [MAGIC map](#) and new [GOV.UK digital services](#). Where the datasets are no longer available as maps, you will be able to download and use within specialist applications.

To find out all the services the Environment Agency have available, please click [here](#).

For any other enquiries please send your request to us at:

Enquiries_EastAnglia@environment-agency.gov.uk.

East Anglia Area

Ipswich Office, Icen House, Cobham Road, Ipswich, Suffolk, IP3 9JD

Brampton Office, Bromholme Lane, Brampton, Huntingdon, PE28 4NE

General Enquiries: 03708 506506

Email: enquiries@environment-agency.gov.uk

Website: <https://www.gov.uk/government/organisations/environment-agency>

Additional information

Please be aware that we now charge for planning advice provided to developers, agents and landowners. If you would like advice to inform a future planning application for this site then please complete our <https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion> and email it to our Sustainable Places team at: planning.brampton@environment-agency.gov.uk. They will initially provide you with a free response identifying the following:

- the environmental constraints affecting the proposal;
- the environmental issues raised by the proposal;
- the information we need for the subsequent planning application to address the issues identified and demonstrate an acceptable development;
- any required environmental permits.

If you require any further information from them (for example, a meeting or the detailed review of a technical document) they will need to set up a charging agreement. Further information can be found on our [website](#).

Climate Change Allowances

The National Planning Practice Guidance refers planners, developers and advisors to the Environment Agency's guidance on considering climate change in Flood Risk Assessments (FRAs). This guidance was updated in October 2021 and is available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

The guidance provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, which varies depending on which management catchment a site lies within. It advises on which allowances to use for assessing the impact of climate change on fluvial flood risk based on vulnerability classification, flood zone and development lifetime.

If you want to discuss this please call our Sustainable Places team on 020 8474 5242.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Anna Butcher
Customers and Engagement Officer



Direct dial: 02030 255472

East Anglia Area

Ipswich Office, Icen House, Cobham Road, Ipswich, Suffolk, IP3 9JD
Brampton Office, Bromholme Lane, Brampton, Huntingdon, PE28 4NE
General Enquiries: 03708 506506
Email: enquiries@environment-agency.gov.uk
Website: <https://www.gov.uk/government/organisations/environment-agency>

242339 Product 4 Map

Legend

-  Statutory Main Rivers
-  Internal Drainage Board



1: 10,000

0 250

Metres



Defended Model Flood Outlines centred on Land at Stewartby, Bedford

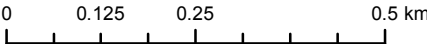
NGR TL0140642902
Ref 242339
Created 30/11/2021

Environment Agency
Bromholme Lane,
Brampton,
Cambridgeshire
PE28 4NE



Legend

- ★ Site
- Main river
- 5% AEP
- 1% AEP
- 0.1% AEP



Information

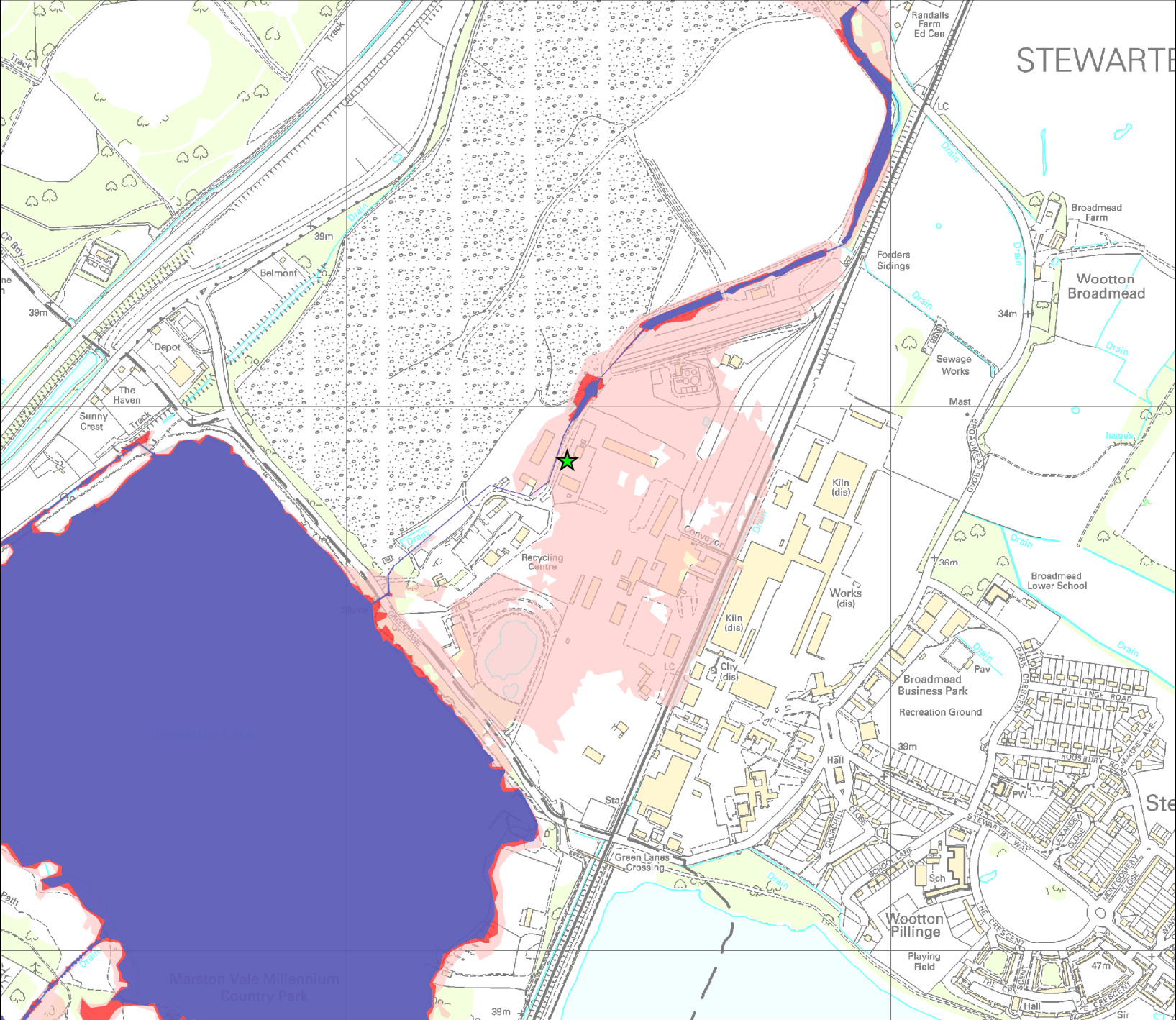
Model Tolerance - Any data included in this product is subject to a standard modelling tolerance of +/- 150mm. The fluvial models used to produce these results are intended for strategic scale use only.

Flood Risk Assessments - The Environment Agency recommends any Flood Risk Assessment should only consider these results in the context of a site specific assessment.

AEP - Annual Exceedance Probability - The probability of a given event occurring in any one year. Please note this is not a return period.

Strategic Scale Model - This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences if present.

Copyright © Environment Agency copyright and / or database rights 2021. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2021.
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk



Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

<https://www.gov.uk/flood-risk-assessment-standing-advice>
<http://planningguidance.planningportal.gov.uk/>

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

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.

Modelled Node Point Locations centred on Land at Stewartby, Bedford

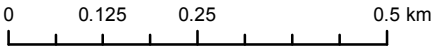
NGR TL0140642902
Ref 242339
Created 30/11/2021

Environment Agency
Bromholme Lane,
Brampton,
Cambridgeshire
PE28 4NE



Legend

- ★ Site
- ▲ Modelled Node Point



Information

Model Tolerance - Any data included in this product is subject to a standard modelling tolerance of +/- 150mm. The fluvial models used to produce these results are intended for strategic scale use only.

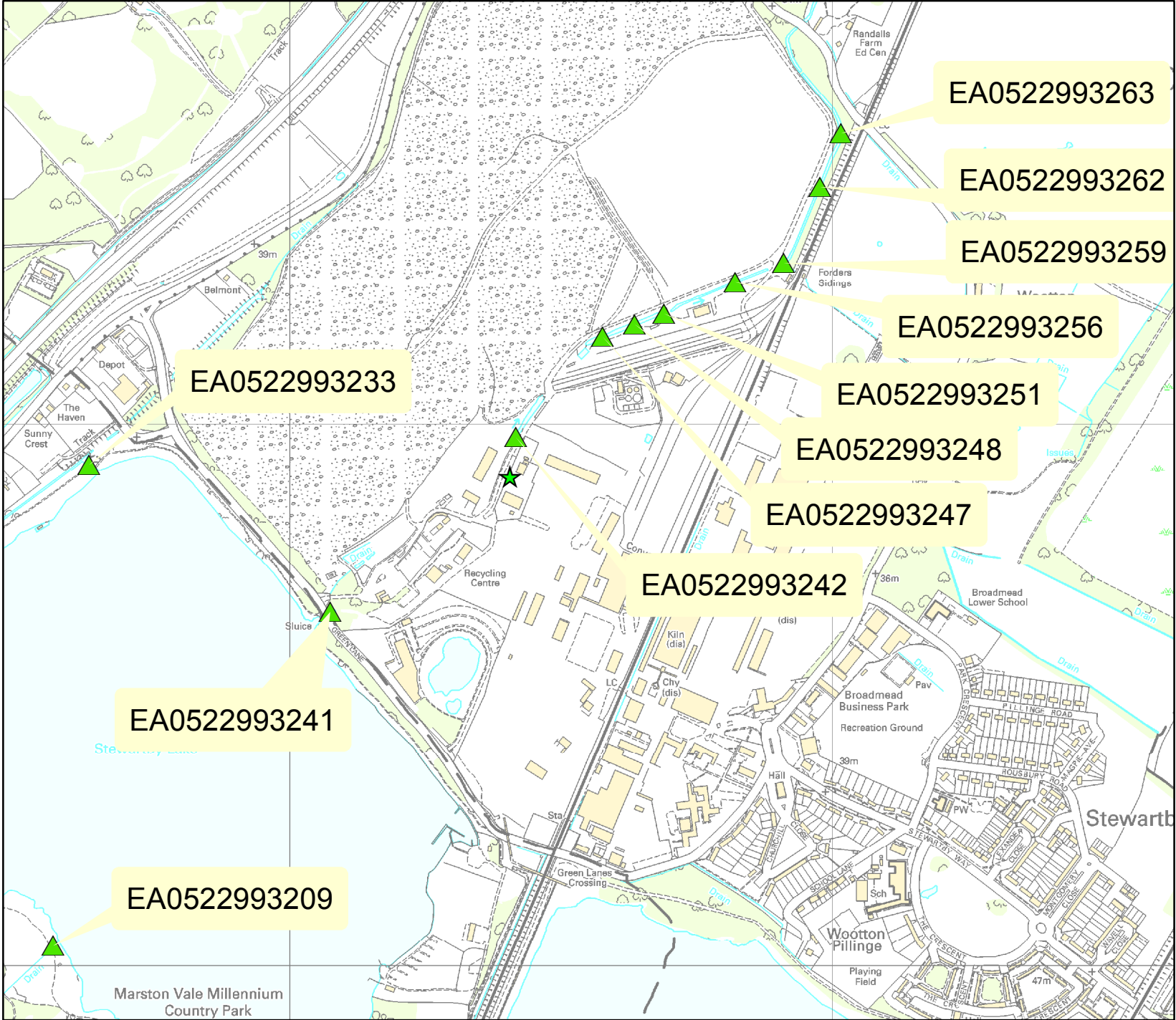
Flood Risk Assessments - The Environment Agency recommends any Flood Risk Assessment should only consider these results in the context of a site specific assessment.

AEP - Annual Exceedance Probability - The probability of a given event occurring in any one year. Please note this is not a return period.

Strategic Scale Model - This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences if present.

Copyright © Environment Agency copyright and / or database rights 2021. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2021.

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





Datasheet - Product 4

30 November 2021

Reference Number	242339
Site	Land at Stewartby, Bedford
Customer	Ruth Evans
NGR	TL0140642902

This datasheet provides supporting information for your Product 4. It will be clearly indicated if we are unable to provide information to fulfil any part of your request.

Model Summary

Model Name	Model Code
Mid Ouse	EA052340

Important Information

The following information should be considered when using the material provided to fulfil this request.

Information	
Limited Modelled Extents Provided	We have only provided a limited number of modelled flood extents for clarity. If you require further extents we will be happy to provide them.
Climate Change Allowances	The 1%+CC AEP flood level in the tables will be based on the 1% annual probability flood event including an additional 20% increase in peak flows to account for climate change impacts. Guidance on climate change allowances for the purpose of flood risk assessments is available on our website at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances . You may need to undertake further assessment / modelling of future flood risk using different climate change allowances to ensure your assessment of future flood risk is based on the best available evidence.

Modelled Water Levels and Flows

The following tables provide modelled in channel water level and flow values. Values are provided for Annual Exceedence Probability (AEP) events, which is the probability of a given event occurring in any one year. This is not a return period.

The fluvial models used to produce these results are intended for strategic scale use only.

If the tables show a value of -9999, this indicates that we have no level or flow data for that particular AEP or node point.

Level Data

Level values are measured in metres above Ordnance Datum (m aOD).

All level data included are subject to standard modelling tolerance of +/-150 millimetres.

Present Day Levels

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
EA0522993209	EA052340	500563	242035	35.3	35.4	35.52	35.54	35.69	35.79	35.88	36.12	36.42
EA0522993233	EA052340	500629	242923	35.34	35.42	35.53	35.55	35.69	35.79	35.88	36.12	36.42
EA0522993241	EA052340	501074	242651	35.16	35.22	35.29	35.3	35.39	35.46	35.51	35.66	36.42
EA0522993242	EA052340	501416	242974	34.12	34.28	34.49	34.52	34.75	34.9	35.02	35.3	36.2
EA0522993247	EA052340	501576	243159	34.04	34.21	34.44	34.47	34.71	34.87	34.99	35.28	36.19
EA0522993248	EA052340	501635	243182	34.02	34.2	34.43	34.46	34.71	34.86	34.98	35.28	36.19
EA0522993251	EA052340	501689	243202	34.01	34.19	34.42	34.46	34.7	34.86	34.98	35.28	36.19
EA0522993256	EA052340	501821	243260	33.67	33.8	33.96	33.99	34.15	34.25	34.33	34.51	35.64
EA0522993259	EA052340	501910	243295	33.34	33.41	33.47	33.49	33.56	33.6	33.63	33.69	34.24
EA0522993262	EA052340	501977	243435	33.26	33.33	33.39	33.41	33.48	33.52	33.55	33.62	34.12
EA0522993263	EA052340	502016	243534	33.18	33.26	33.32	33.35	33.42	33.46	33.49	33.57	34.09

Climate Change Levels

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
EA0522993209	EA052340	500563	242035	36.15	-9999	-9999	-9999	-9999	-9999
EA0522993233	EA052340	500629	242923	36.15	-9999	-9999	-9999	-9999	-9999
EA0522993241	EA052340	501074	242651	35.68	-9999	-9999	-9999	-9999	-9999
EA0522993242	EA052340	501416	242974	35.34	-9999	-9999	-9999	-9999	-9999
EA0522993247	EA052340	501576	243159	35.32	-9999	-9999	-9999	-9999	-9999
EA0522993248	EA052340	501635	243182	35.32	-9999	-9999	-9999	-9999	-9999
EA0522993251	EA052340	501689	243202	35.31	-9999	-9999	-9999	-9999	-9999
EA0522993256	EA052340	501821	243260	34.54	-9999	-9999	-9999	-9999	-9999
EA0522993259	EA052340	501910	243295	33.7	-9999	-9999	-9999	-9999	-9999
EA0522993262	EA052340	501977	243435	33.63	-9999	-9999	-9999	-9999	-9999
EA0522993263	EA052340	502016	243534	33.58	-9999	-9999	-9999	-9999	-9999

Flow Data

Flow values are measured in cubic metres per second (cumecs - m³/s).

Present Day Flows

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
EA0522993209	EA052340	500563	242035	1.26	1.48	1.7	1.78	2.06	2.25	2.4	2.84	3.97
EA0522993233	EA052340	500629	242923	1.49	1.53	1.57	1.58	1.62	1.64	1.66	1.69	1.83
EA0522993241	EA052340	501074	242651	2.69	2.96	3.28	3.33	3.65	3.85	3.99	4.35	11.72
EA0522993242	EA052340	501416	242974	2.69	2.96	3.28	3.32	3.65	3.84	3.99	4.34	10.84
EA0522993247	EA052340	501576	243159	2.69	2.96	3.28	3.32	3.65	3.84	3.99	4.34	10.29
EA0522993248	EA052340	501635	243182	2.69	2.96	3.28	3.32	3.65	3.84	3.99	4.34	10.12
EA0522993251	EA052340	501689	243202	2.69	2.96	3.28	3.32	3.65	3.84	3.99	4.34	10.02
EA0522993256	EA052340	501821	243260	2.7	2.96	3.28	3.32	3.65	3.84	3.99	4.34	9.79
EA0522993259	EA052340	501910	243295	2.7	2.96	3.28	3.32	3.65	3.85	3.99	4.34	9.72
EA0522993262	EA052340	501977	243435	2.7	2.96	3.28	3.32	3.65	3.85	3.99	4.34	9.72
EA0522993263	EA052340	502016	243534	2.7	2.96	3.29	3.32	3.65	3.85	3.99	4.34	9.72

Climate Change Flows

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
EA0522993209	EA052340	500563	242035	2.91	-9999	-9999	-9999	-9999	-9999
EA0522993233	EA052340	500629	242923	1.7	-9999	-9999	-9999	-9999	-9999
EA0522993241	EA052340	501074	242651	4.4	-9999	-9999	-9999	-9999	-9999
EA0522993242	EA052340	501416	242974	4.38	-9999	-9999	-9999	-9999	-9999
EA0522993247	EA052340	501576	243159	4.38	-9999	-9999	-9999	-9999	-9999
EA0522993248	EA052340	501635	243182	4.38	-9999	-9999	-9999	-9999	-9999
EA0522993251	EA052340	501689	243202	4.38	-9999	-9999	-9999	-9999	-9999
EA0522993256	EA052340	501821	243260	4.38	-9999	-9999	-9999	-9999	-9999
EA0522993259	EA052340	501910	243295	4.38	-9999	-9999	-9999	-9999	-9999
EA0522993262	EA052340	501977	243435	4.38	-9999	-9999	-9999	-9999	-9999
EA0522993263	EA052340	502016	243534	4.38	-9999	-9999	-9999	-9999	-9999

Recorded Flood Events

Where included, the Recorded Flood Event Outlines map provides an indication of areas which have flooded. Not all properties shown to be within the outline will have flooded.

Flood Event	Start	End	Source	Cause
None			N/A	We have no historic flood event information for this area. It is possible that other flooding may have occurred that we do not have records for, and other organisations such as: local authorities or IDBs may have records.

General Information

Flood Map for Planning (Rivers and Sea)

The Flood Map for Planning (Rivers and Sea) indicates the area at risk of flooding for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring in any year for fluvial (river) flooding (Flood Zone 3).

It also shows the extent of the Extreme Flood Outlines (Flood Zone 2) which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. The Flood Zones refer to the land at risk of flooding and do not refer to individual properties.

The Flood Map for Planning (Rivers and Sea) can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-map-for-planning.service.gov.uk> or downloaded in GIS format under an open data licence from the following address: <https://data.gov.uk/publisher/environment-agency>

The Flood Map is updated on a quarterly basis to account for any amendments required.

Surface Water, Ordinary Watercourses and Groundwater Flooding

Lead Local Flood Authorities (LLFA) are responsible for managing local flood risk from ordinary watercourses, surface water flooding and groundwater flooding. You should check with the LLFA as they may have more up to date information regarding this type of flooding.

The Risk of Flooding from Surface Water Flood Map can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Information on how to reduce the impact of flooding from groundwater can be found online by the following link: <https://www.gov.uk/government/publications/flooding-from-groundwater>

Flooding from Reservoirs

The Risk of Flooding from Reservoirs Flood Map can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Sewer Flooding

Your local water company may have information on sewage flooding in your area of interest.



KRS Environmental Ltd

Mob: 07857 264 376

Tel: 01686 668957

Tel: 01484 437420

Email: keelan@krsenvironmental.com

Web: www.krsenvironmental.com



IRELAND | UK | UAE | BAHRAIN | KSA

BYRNELOOBY

www.byrneology.com

Email: info@byrneology.com