Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

Sustainable Drainage Statement

Report Prepared by: BWB Consulting Ltd

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Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

This document forms a part of the Environmental Statement for the Hinckley National Rail Freight Interchange project.

Tritax Symmetry (Hinckley) Limited (TSH) has applied to the Secretary of State for Transport for a Development Consent Order (DCO) for the Hinckley National Rail Freight Interchange (HNRFI).

To help inform the determination of the DCO application, TSH has undertaken an environmental impact assessment (EIA) of its proposals. EIA is a process that aims to improve the environmental design of a development proposal, and to provide the decision maker with sufficient information about the environmental effects of the project to make a decision.

The findings of an EIA are described in a written report known as an Environmental Statement (ES). An ES provides environmental information about the scheme, including a description of the development, its predicted environmental effects and the measures proposed to ameliorate any adverse effects.

Further details about the proposed Hinckley National Rail Freight Interchange are available on the project website:

http://www.hinckleynrfi.co.uk/

The DCO application and documents relating to the examination of the proposed development can be viewed on the Planning Inspectorate's National Infrastructure Planning website:

https://infrastructure.planninginspectorate.gov.uk/projects/east-midlands/hinckley-national-rail-freight-interchange/

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P03	01/12/22	S2	Updated highways descriptions	RJ	DG	CMD
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EXECUTIVE SUMMARY

This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

Proposed discharge rates should be set on a prorated basis of 4.1l/s/ha which equates to the equivalent greenfield QBAR rate, total discharge rates should not exceed that of the calculated total greenfield discharge rate for any given outfall.

Attenuation volumes have been set at 650m3 per drained impermeable hectare, based on preliminary calculations. Final volumes should consider all aspects of the drainage infrastructure and as such final volumes will be determined during detailed design.

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1. INTRODUCTION

1.1. A Sustainable Drainage Statement (SDS) sets out the principles of drainage design for a development and summarises the reasoning behind the chosen design. This includes consideration of national and local guidance, justification of specific flow rates, volumes of attenuated storage, as well as the appropriate level of treatment to be provided to surface water runoff.

1.2. This SDS has been produced by BWB Consulting on behalf of Tritax Symmetry (Hinckley) Ltd in respect of a Development Consent Order (DCO) for a Strategic Rail Freight Interchange (SRFI) on land adjacent to the north-west Junction 2 of the M69 and includes highway works in the wider surrounding area.

1.3. A Flood Risk Assessment has been developed for the site (reference HNRFI-BWB-ZZ-XX-RP-YE-0010_FRA and this Sustainable Drainage Statement accompanies this overarching document.

1.4. This SDS is intended to support an application for a DCO based upon parameter plans and an illustrative layout, as such the level of detail included is commensurate and subject to the level of detail available at this stage. A parameters plan & illustrative layout is included as **Appendix 1**.

1.5. A location plan illustrating the DCO site is illustrated within **Figure 1.1**, with contextual information provided within **Table 1.1**.

Figure 1.1: The DCO Site Location Plan

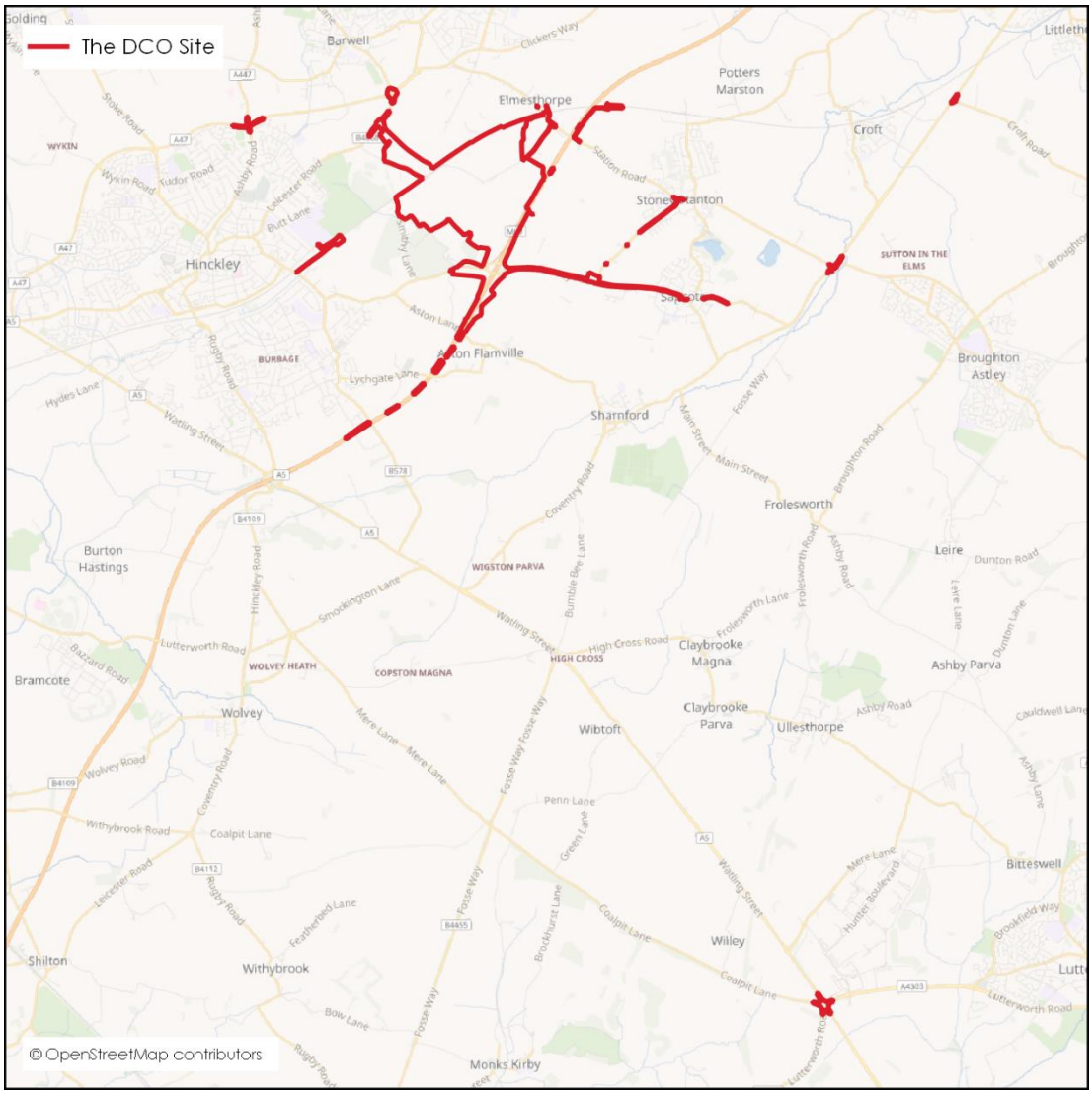


Table 1.1: Site Details

Site Name	Hinckley National Rail Freight Interchange
Location	Leicestershire
Development Type	Primary Road & Rail Infrastructure Rail Port, Warehouses & Ancillary Buildings, and associated infrastructure Landscaping, Ecology & Amenity Areas Highway, Junction and footpath improvements
Lead Local Flood Authority	Leicestershire County Council
Environment Agency Area	East Midlands
Sewerage Undertaker	Severn Trent Water

Proposed Scheme

1.6. The project DCO boundary is shown in **Figure 1.1**, and a parameters plan of the proposals is included as **Appendix 1** for reference.

1.7. The development on the Main HNRFI Site includes:

- The demolition of Woodhouse Farm, Hobbs Hayes, Freeholt Lodge and the existing bridge over the Leicester to Hinckley railway on Burbage Common Road;
- new rail infrastructure including points off the existing Leicester to Hinckley railway providing access to a series of parallel sidings at the HNFRI;
- an intermodal freight terminal or 'Railport';
- warehousing and ancillary buildings;
- an energy centre incorporating an electricity substation;

- a lorry park with welfare facilities and a fuel filling station;
- a site hub building and ancillary car parking;
- terrain remodelling, hard and soft landscape works, amenity water features and planting;
- noise attenuation measures, including acoustic barriers up to six metres in height;
- habitat creation and enhancement;
- pedestrian, equestrian and cycle access routes and infrastructure;
- utility compounds, plant and service infrastructure;
- security and safety provisions inside the HNRFI including fencing and lighting;
- drainage works including surface water retention ponds, underground attenuation tanks and swales;

1.8. Beyond the Main HNRFI Site, the Main Order Limits include:

- works to M69 Junction 2 comprising the reconfiguration of the existing roundabout and its approach and exit lanes, the addition of a southbound slip road for traffic joining the M69 motorway and the addition of a northbound slip road for traffic leaving the M69 motorway at Junction 2;
- a new road ('the A47 Link Road') from the modified M69 Junction 2 to the B4668 / A47 Leicester Road with a new bridge over the railway, providing vehicular access to the proposed HNRFI from the strategic highway network;
- modifications to several junctions and amendments to Traffic Regulation Orders on the local highway network;
- works affecting existing pedestrian level crossings and footpaths.

1.9. The more minor offsite proposals are identified within **Figure 1.2** to **Figure 1.7**. A summary description is provided within **Table 1.2**.

Figure 1.2: Off-Site Highway/Railway Works Location 1

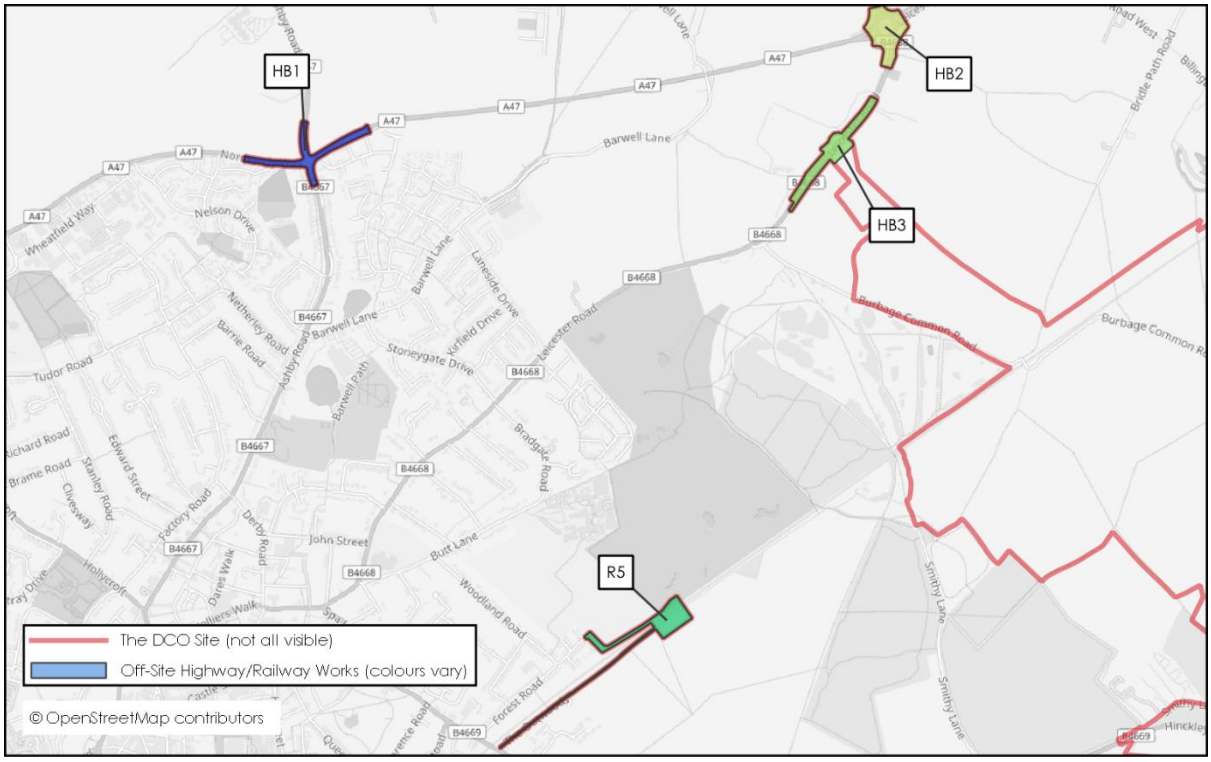


Figure 1.3: Off-Site Highway/Railway Works Location 2

Figure 1.4: Off-Site Highway/Railway Works Location 3

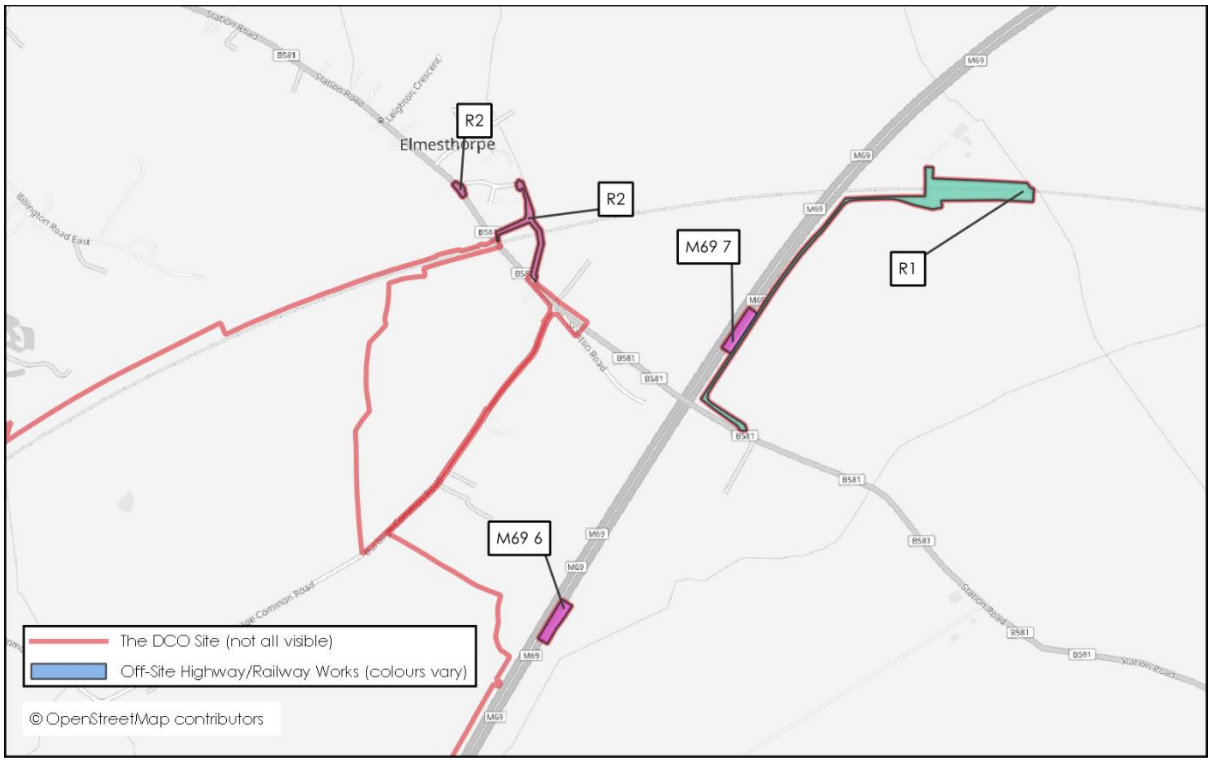


Figure 1.5: Off-Site Highway/Railway Works Location 4

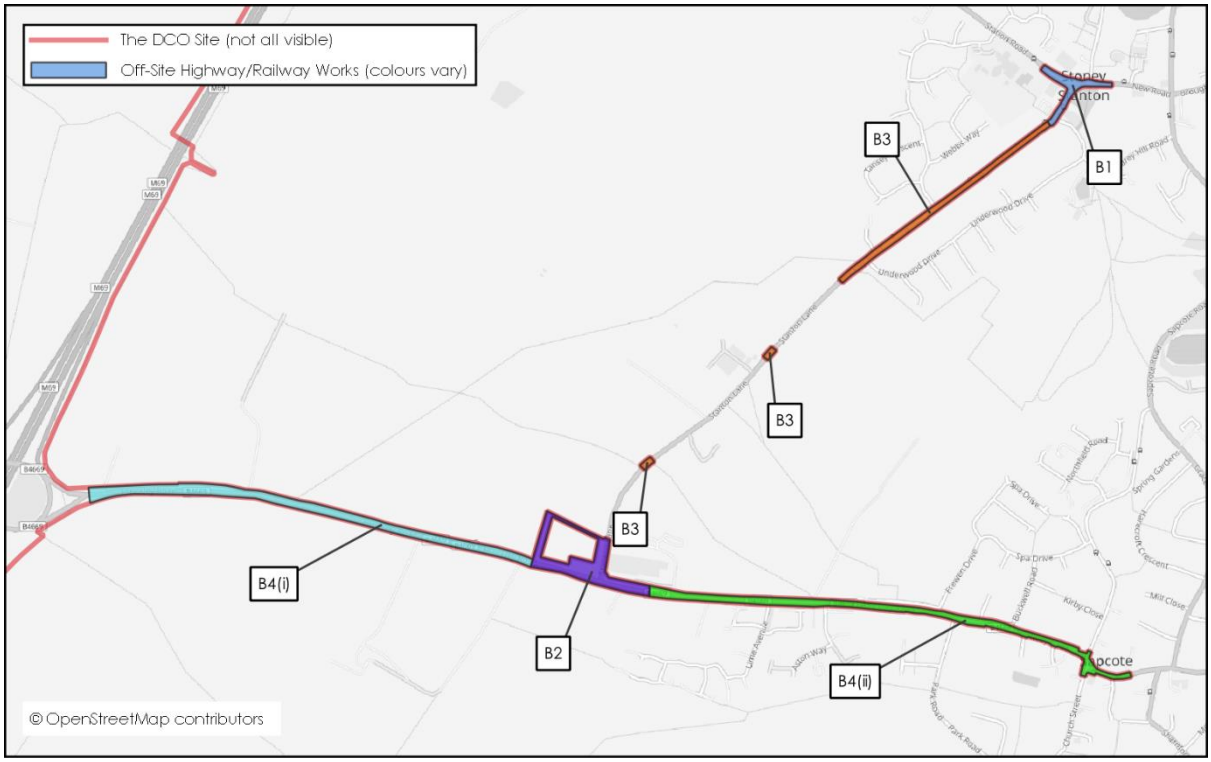


Figure 1.6: Off-Site Highway/Railway Works Location 5

Figure 1.7: Off-Site Highway/Railway Works Location 6

Table 1.2: Summary of Highway & Railway Works away from the Main HNRFI Site, the A47 Link Road, and the M69 Junction 2

ID	Location	Description of Proposed Works
B1	Junction of B581 Station Road / New Road and Hinckley Road, Stoney Stanton	The existing mini roundabout would be replaced by traffic lights with signalised crossings for pedestrians.
B2	Junction of B4669 Hinckley Road and Stanton Lane, west of Sapcote	Traffic lights would be introduced with a phase to allow pedestrians and cyclists to cross.
B3	Stanton Lane / Hinckley Road, south-west of Stoney Stanton	Reduction of the speed limit to 40mph from the national speed limit; traffic calming features and formalisation of on-carriageway parking.
B4 i	B4669 Hinckley Road/ Leicester Road, Sapcote	Traffic calming features, creation of cycle infrastructure and wider footways, public realm and junction improvements and a bus stop relocation at junction of Church Street and B4669. A new pedestrian crossing is included.
B4 ii		
B4 iii		

ID	Location	Description of Proposed Works
B5	Junction of B4114 Coventry Road and B581 Broughton Road at Soar Mill, south-east of Stoney Stanton	New traffic lights are already scheduled to be introduced as part of the Broughton Astley S278 works (Planning Ref: 19/00856/OUT). Should the above committed scheme not come forward in advance of the opening of the HNRFI access infrastructure, the applicant proposes to undertake a mitigation scheme. This would include signalisation of the ghost island junction with the Broughton Road with separate right and left turn lanes and connecting to the existing signalled junction at Coventry Road on the B4114. This layout differs from the S278 proposals by removing the Coventry Road widening, the traffic levels forecast do not require improvements on this arm.
B6	Junction of B4114 Coventry Road and Croft Road, south-west of Narborough	Lane widening on junction approaches
HB1	Junction of A47 Normandy Way and A447 Ashby Road, Hinckley	It is proposed that the approach roads to this junction would all be widened to accommodate additional traffic. Indicative right turn and two lanes would be provided through the junction in a westbound direction.
HB2	Junction of A47 Normandy Way / Leicester Road, the B4668 Leicester Road and The Common, south-east of Barwell	Widening of the entry arm on the B4668 Leicester Road

ID	Location	Description of Proposed Works
HB3	Junction of B4668 and New A47 Link Road, northeast of the site access (Access Infrastructure)	Provision of a three-arm new roundabout access to the B4668 Leicester Road, including a segregated left turn lane southbound from the A47. (*Note: For the purpose of this FRA, due to its close proximity, this has been assessed as part of the A47 Link Road*).
H1	Cross in Hand roundabout at the junction of the A5 Watling Street, A4303 Coventry Road, B4428 Lutterworth Road and Coal Pit Lane, west of Lutterworth	Increased roundabout radius and widened lane entries, with two lanes marked for longer distances for traffic approaching the junction on the A5 Watling Street southbound, the B4027 and on Coal Pit Lane.
R1	B581 to footpath south of Thorney Fields Farm	The proposals in this area include the closure of a level crossing and the existing public right of way diverted with pedestrians rerouted to an existing bridge over the railway south of Thorney Fields Farm.
R2	Footpath between Bostock Close and the B581 Station Road, opposite the Wentworth Arms public house.	The proposals in this area include the permanent closure of a public right of way via a level crossing. Pedestrians would instead be able to cross the railway using the existing Station Road bridge, 75 metres to the south-west. A drop kerb at the junction of Bostock Close and the B581 is also included
R3 R4	Located on the Leicester to Hinckley railway immediately to the north of the Main HNRFI Site	Closure of level crossings. (*Due to their location within/immediately next to the Main Order Limits, and the inconsequential nature of the proposals from a flood risk perspective, a standalone assessment of the flood risk at their locations is not required*).

ID	Location	Description of Proposed Works
R5	The Outwoods, between Burbage and Hinckley	The proposals in this area include the replacement of the level crossing with a pedestrian footbridge, with associated public rights of way diversions.
M69 1 to M69 7	The M69 on the approach to Junction 2	Changes to signage

Sustainable Drainage Guidance

1.10. Leicestershire County Council as the Lead Local Flood Authority (LLFA) have published a Statutory Consultation Checklist[1] and Guidance[2], on receipt of a formal consultation, the Lead Local Flood Authority (LLFA) will assess the submission in line with the checklist.

1.11. All major applications should include the following information to a level of detail appropriate to the scale of the development;

- Evidence that the site can be drained;
    - In line with the drainage hierarchy for assessing the most appropriate method of discharging surface water.
- Topographic and ground investigation details;
    - Sufficient topographic detail should be submitted to support the drainage proposals. For larger sites, a full topographic survey should be submitted;

[1] Planning Applications: Lead Local Flood Authority Statutory Consultation Checklist (Leicestershire County Council, October 2018)
[2] Interim LLFA Guidance Note: Planning and Development in Leicestershire (Leicestershire County Council, October 2018)

- A desk study should be a minimum approach for a ground investigation review.

- The total impermeable area pre and post development;
    - Provide an indication of pre and post development impermeable areas for comparison.

- All potential flood risk sources have been identified and assessed;
    - The need for modelling should be identified and undertaken where required;
    - The level of detail within a FRA should be appropriate to the scale and nature of the development.

- Existing and proposed peak discharge rates;
    - The existing and proposed discharge rate should be clearly identified and expressed in litres per second (l/s) and litres per second per hectare (l/s/ha);
    - Evidence should be provided to substantiate existing and proposed flow rates;
    - Where discharging to a receiving system maintained and/or operated by another authority (i.e. water company, highway authority, Canals and River Trust, Internal Drainage Board etc.) evidence of consultation and the acceptability in principle of any discharge into their assets should be submitted for consideration by the LLFA and LPA.

- Consideration of sustainable drainage systems;
    - Sustainable drainage systems (SuDS) for managing surface water run-off should be considered for all development;
    - Where SuDS are proposed, these should be detailed to an appropriate level for the type of planning application.

- Attenuation volume calculations;
    - An estimate using industry standard methodology and tools to demonstrate any required attenuation volumes for surface water

storage and confirmation that this can be located within the development masterplan;

- The calculations for attenuation requirements should allow for storm events up to the 1 in 100 year return period plus the appropriate allowance for climate change;
- Where applicable, the impacts of 'urban creep' should be included. Unless it can be demonstrated otherwise, a 10% increase in the impermeable area should be included within the storage calculations.

- Consideration of the maintenance and management of all drainage elements;
  - Details submitted should consider how drainage proposals will be operated and maintained (including access) for the lifetime of the development with particular consideration given to shared elements that are likely to be maintained privately.

1.12. Furthermore, the LLFA will assess all applications in line with the current planning legislation, including;

- National Planning Policy Framework[3] (NPPF),
- Non-Statutory Technical Standards[4],
- Written Ministerial Statement regarding Sustainable Drainage[5] (HCW161),
- The SuDS Manual – C753[6],
- Flood Risk Planning Policy Guidance[7],
- Building Regulations Part H[8].

1.13. To comply with the requirements of the LLFA this Sustainable Drainage Statement has been prepared, in line with the guidance outlined above.

[3] Revised National Planning Policy Framework, Ministry of Housing, Communities & Local Government, amended 2021
[4] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems
[5] Written Ministerial Statement regarding Sustainable Drainage (The Secretary of State for Communities and Local Government, December 2014)
[6] The SuDS Manual (CIRIA, 2015)
[7] Flood Risk and Coastal Change Guidance (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (August, 2021)
[8] Building Regulations Part H: drainage and waste disposal (Ministry of Housing, Communities & Local Government, 2015)

2. EXISTING CONDITIONS

2.1. The Main HNRFI Site lies 3 km to the north-east of Hinckley town centre, to the north-west of Junction 2 of the M69. The Nuneaton to Felixstowe railway forms the north-western boundary, with the M69 motorway defining the south-eastern boundary. To the south-west are blocks of deciduous woodland (including Burbage Wood, Aston Firs and Freeholt Wood), a gypsy and traveller community site and a mobile home site. Beyond the north-eastern boundary lies the village of Elmesthorpe, a linear settlement on the B581 Station Road.

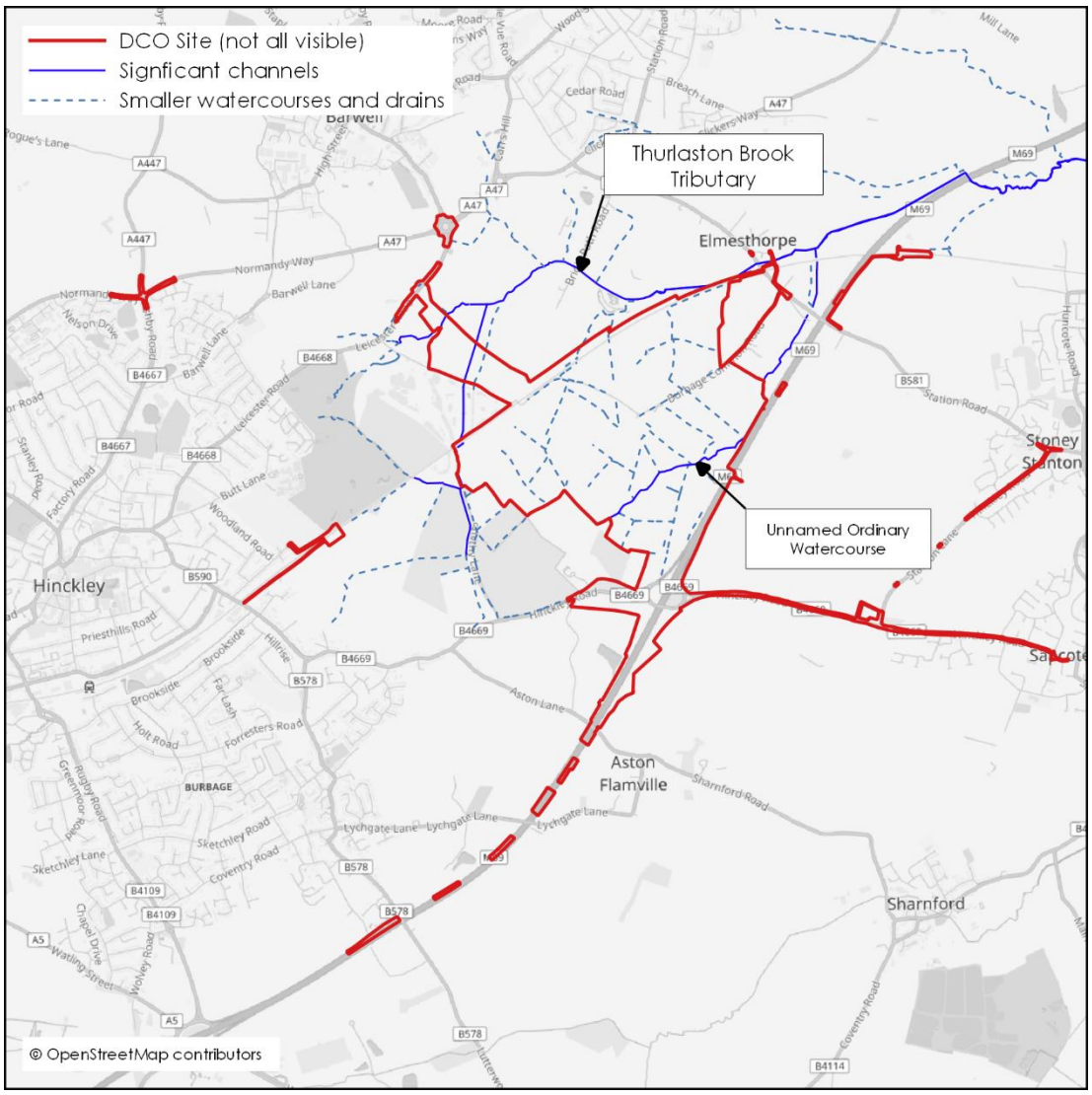
2.2. The Main HNRFI Site comprises the proposed SRFI, which includes but may not be limited to, the railway sidings and freight transfer area alongside the two-track railway between Hinckley and Leicester, land for the development of storage and logistics sheds, site hub building, energy centre, and associated lorry and car parking, infrastructure, and landscaping.

2.3. The Development Consent Order (DCO) Site extends beyond the Main HNRFI Site to include other elements including a new link road from M69 Junction 2 to the B4668 (Leicester Road) ('the A47 Link Road'), and alterations to M69 Junction 2 – this larger area is referred to as the Main Order Limits.

2.4. The DCO Site also extends beyond the Main Order Limits to include other minor highway, junction, and footpath alterations.

2.5. The watercourse network in and around the Main Order Limits, as shown on Ordnance Survey mapping and identified on a site-specific topographical survey (**Appendix 2**), are shown in **Figure 2.1**. The Main Order Limits are located within the catchment of an unnamed tributary of the Thurlaston Brook. This watercourse issues from the eastern side of Hinckley and flows eastwards to the north of the railway line.

Figure 2.1: Watercourse Network



2.6. The Main HNFRI site is predominantly greenfield in nature comprising a series of agricultural fields. Three areas of brownfield development are located within the Main HNRFI Site known as Woodhouse Farm, Hobbs Hayes, Freeholt Lodge.

2.7. For the purposes of this assessment the entire Main HNRFI Site is considered to be greenfield in nature with runoff from the site generally flowing either south to the unnamed ordinary watercourse or north to the Thurlaston Brook Tributary via the network of onsite ditches and culverts beneath the railway. The northern catchment is split between four outfalls, the southern portion is considered to be one catchment, this is summarised within **Table 2.1**. An indicative catchment plan for the existing Site and its various outfalls is shown on BWB Dwg No. HRF-BWB-EWE-ZZ-DR-CD-00501 which is included as **Appendix 3**.

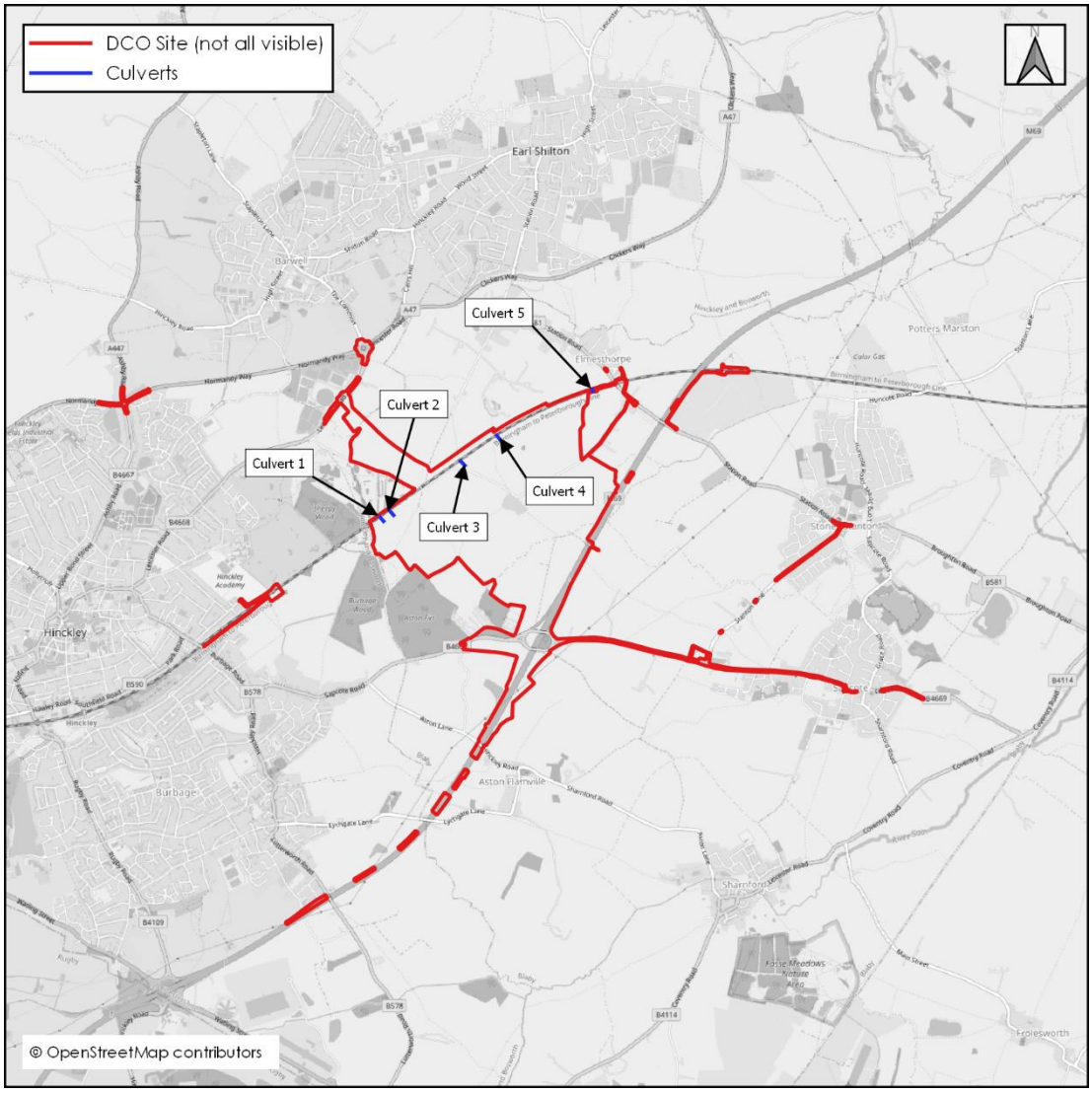
Table 2.1: Existing Outfall Summary

	Catchment	Outfall	QBAR (l/s)
Northern Catchment	1	Culvert 1	64.1
	2	Culvert 3	168.1
	3	Culvert 4	46.1
	4	Culvert 5	136.4
Southern Catchment	5	UOW	369.9

2.8. Severn Trent Water sewer asset records have been obtained and included as **Appendix 4**. The records show a 517mm diameter rising main crossing the north-western corner of the Main HNFRI, the same rising main also crosses mid-way through the DCO boundary for the A47 Link Road. There are public foul sewers shown to serve the residential properties off Burbage Common Road and Stanton Road which discharge north westerly to the Elmesthorpe – Bostock Close Sewage Pumping Station. There is a public combined sewer shown immediately south of the DCO boundary along Smithy Lane which flows south westerly. Beyond this there are various public sewers recorded within the DCO boundary associated with the various offsite highway and footpath works.

2.9. There are known Network Rail drainage assets / culverts along the northern boundary of the Main HNRFI Site. The existing culverts that fall within the DCO limits are shown in **Figure 2.2**.

Figure 2.2: Railway Culvert Locations



2.10. Culverts 1, 3, 4 and 5 will form drainage outfalls from the proposed development, Culvert 2 will remain unaffected. Culverts 1 and 5 will remain in-site and there will be no physical works required to accommodate the site proposals. To accommodate the proposed rail port, Culverts 3 and 4 will need to be extended south (within the site boundary) beyond the proposed rail port.

Existing Runoff Rates

2.11. An assessment of the existing surface water runoff rates from northern and southern catchments of the Main HNFRI Site has been undertaken and is summarised within **Table 2.2**. Calculations are included within **Appendix 5**. The northern catchment is split between four outfalls, the existing split is shown on the

catchment plan included as **Appendix 3**.

2.12. Due to the size of the Site, the runoff rates have been estimated using the IH124 method which applies appropriate reduction factors based on the contributing area, as recommended in Interim Code of Practice for Sustainable Drainage[9]. This was undertaken within Micro Drainage Source Control.

Table 2.2: Existing Runoff Rate from the Site

Return Period (Yrs.)	Northern Catchment (101.2ha) Runoff Rate (l/s)	Southern Catchment (89.8h) Runoff Rate (l/s)	Average Prorated Runoff Rate (l/s/ha)
1	334.2	307.0	3.4
Mean Annual Flow Rate (QBAR)	414.7	369.9	4.1
30	812.5	724.7	8.0
100	1065.7	950.6	10.6

2.13. The average QBAR rate across each of the catchments equates to 4.1l/s/ha and as such will be used across the smaller proposed catchment areas across the DCO limits, as required. This is considered to be a conservative approach as runoff from smaller catchments would actually result in higher runoff rates per hectare.

[9] The National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage

Existing Runoff Volume

2.14. An assessment of the existing surface water runoff rates from the Main HNFRI site (191ha) has been made for a 1 in 100-year, 6 hour storm.

2.15. As the existing site is permeable, the runoff volume has been calculated using the Source Control module within Micro Drainage to be **54,342m^3**, results are included within **Appendix 6**.

2.16. Per hectare this equates to a runoff volume of approximately **285 m^3.**

3. SURFACE WATER DRAINAGE STRATEGY

3.1. The proposed drainage strategy sets out the principles that should inform the future detailed design. For the purposes of this assessment the highway corridors and rail port have been taken as 100% impermeable and the development plots have been taken as 90% impermeable. A further allowance will be required from areas of bunds and railway ballast which are assumed to be 20% impermeable, this will need to be considered through detailed design.

Drainage Hierarchy

3.2. The Planning Policy Guidance[10] and the SuDS Manual[11] identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

3.3. The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

3.4. The existing runoff regime from the Main HNRFI Site is typical of that of a Greenfield site whereby small amounts of rainfall are infiltrated into the ground and the remainder runs off into the network of ditches and watercourse.

3.5. The preliminary ground investigation works undertaken by Hydrock (June 2019) identified Bosworth Clay Member, Thrussington Member and Mercia Mudstone across the site. The previous works concludes that infiltration rates are likely to be low across the site due to the clay soils encountered. This is further supported by the soil value of 0.45 within Micro Drainage, suggesting limited infiltration potential. It may be prudent to perform infiltration testing following the extensive earthworks exercise across the site when formation levels of the various SuDS features are better defined, however, it is thought unlikely that the rates achieved will be suitable and should be treated as providing a nominal drainage function to

[10] Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/.
[11] The SuDS Manual (C753). CIRIA 2015.

ensure a robust design unless proven otherwise.

3.6. To mimic the existing runoff regime, it is proposed to discharge the Main HNFRI Site via various connections to the existing network of ditches and watercourses. To not increase flood risk the site will outfall via ten discharge points with proposed flow rates not exceeding that of the existing scenario, a proposed catchment plan which identifies the proposed locations and discharge rates is shown on BWB Dwg No. HRF-BWB-EWE-ZZ-DR-CD-00503 which is included as **Appendix 7**.

3.7. Separate outfalls will be required for the A47 Link Road and the M69 Junction 2 works, and these are discussed later within this report. The offsite highway and footpath works will utilise the existing infrastructure and major new drainage connections are not anticipated.

Peak Flow Control

3.8. In order to comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems S2-S3[12], runoff from greenfield developments should not exceed the equivalent greenfield rates for the 1 and 100-year return period events.

3.9. To comply with the peak flow control criterion, it is proposed to restrict the discharge rate from the development to the receiving watercourses / culverts at the equivalent greenfield QBAR rate up to and including the 1 in 100-year plus climate change event. This is summarised within **Table 3.1**.

3.10. Due to the size and nature of the development proposals at this stage, the assessment has been set per hectare which can be used on a prorated basis when drained impermeable areas are fixed.

[12] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

Table 3.1: Existing & Proposed Runoff Rates

Return Period (Yr.)	Existing Runoff Rate per hectare of greenfield area (l/s/ha)	Proposed Discharge Rate per hectare of impermeable area (l/s/ha)
1	3.4	4.1
QBAR	4.1	
30	8.0	
100	10.6	
100 + CC%	-	

3.11. This approach fulfils the necessary peak runoff control criteria and should be used to base the proposed discharge rates through detailed design. The proposed discharge rate to any one outfall should not exceed that of the existing discharge rates identified on the existing catchment plan, BWB Dwg No. HRF-BWB-EWE-ZZ-DR-CD-00501 which is included as **Appendix 3**.

Attenuated Storage

3.12. As the development proposals require a restricted runoff rate, it will be necessary to provide attenuated storage to balance the excess volume in a safe manner within the site.

3.13. The surface water storage should be located within the site in a position where it can receive runoff from the development and discharge from the site by gravity, and also in a position where it is hydraulically isolated from any fluvial floodplain or external surface water floodplain/ overland flow route that may be present in the site.

3.14. Sufficient storage for events up to the 1 in 100-year storm with an allowance for climate change should be provided.

3.15. For the purpose of this outline assessment, the attenuation has been calculated using 1ha of impermeable area for the 1 in 100-year storm event plus 25% climate change using a singular storage structure. There is a significant amount of upstream infrastructure / source control SuDS that this assessment excludes and therefore it

is anticipated through detailed design that the higher climate change allowances will be accommodated within upstream network, or the freeboard provided within the basins.

3.16. A simulation has been run using Micro Drainage Source Control to identify the necessary storage provision. Using a restriction of 4.1 l/s/ha, the volume of attenuated storage required for the development, per hectare of impermeable area has been calculated for storm events up to the 100 year + 25% storm. The results are summarised in **Table 3.2** and calculations are included as **Appendix 8**.

Table 3.2: Outline Attenuated Storage Requirements

Rainfall Method	Critical Storm	Maximum Volume (m3)
FSR	720 min Winter	581.1
FEH	600 min Winter	646.9

3.17. At this conceptual design stage, a conservative value of 650m^3 of storage per hectare of impermeable development has been used when determining the attenuation requirements across the development. This allows the derivation of runoff rates based purely on the proposed drainage areas and ensures that any areas that were to remain undeveloped would not contribute towards the runoff rates, thus providing a conservative approach in terms of overall discharge rates and attenuation requirements.

3.18. An additional calculation sheet is provided within **Appendix 8** to demonstrate that the 40% climate change allowance event would be contained within the freeboard of a proposed structure. The overall attenuation requirements per hectare of impermeable area increases to approximately 735m^3 during the higher climate change events.

3.19. It is envisaged that the final required attenuated storage volume will be determined during the detailed design stage, once the development layout and drainage areas are fixed.

Runoff Volume Control

3.20. The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6[13] states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6-hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume. Where it is not reasonably practicable to constrain the volume of runoff from a development at or below the existing volume, then the runoff must be discharged in a manner that does not adversely affect flood risk, i.e.:

- The additional runoff volume resulting from the development (the 'long term storage volume') should be discharged separately from the site at a rate of 2 l/s/ha or less. Or,
- All the runoff volume from the development should be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions or less. Or,
- All the runoff volume from the development should be discharged at a rate of 2 l/s/ha or less.

3.21. An estimate of the post-development runoff volume from the 1 in 100-year 6-hour storm can be derived from the Micro Drainage calculations, as provided within **Appendix 8**. The existing and post-development runoff volumes are compared within **Table 3.3**.

Table 3.3: Runoff Volume Comparison

Existing Volume per Hectare (m3)	Proposed Volume Per Hectare (m3)	Difference per Hectare (m3)
285	642	357

3.22. The 1 in 100-year 6-hour storm runoff volume from the site has been shown to increase as a result of the proposed development. However, as the runoff volume from the development will be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions, the volume control criteria will

[13] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

be met.

Sustainable Drainage Systems

3.23. The proposed drainage strategy can be split into four distinct areas, proposals for each are outlined within the below sections. The respective concept surface water drainage layouts for each are included as **Appendix 9**.

3.24. The principles outlined previously within this report, such as the average greenfield runoff rate of 4.1l/s/ha (**Table 2.2**) and the resulting attenuation requirement of 650m^3/ha (**Table 3.2**) have been used on a pro rata basis to inform the proposed drainage strategy for the Site.

Main HNRFI Site

3.25. A concept surface water drainage layout for the Main HNRFI Site is shown on BWB Dwg No. HRF-BWB-EWE-ZZ-DR-CD-00502.

3.26. There is an existing unnamed watercourse which runs from west to east in the southern portion of the Main HNRFI Site, it is proposed to divert this watercourse to accommodate the proposals for the Site. Two of the existing railway culverts will need to be extended south within the Site. An indicative route for the diversion and extension to the culverts is identified on the concept drainage layout.

3.27. The following SuDS features have been considered appropriate for the development:

- Silt traps
- Sump outfall units/gullies
- Permeable paving (where possible)
- Proprietary vortex separators
- Filter strips
- Geocellular attenuation crates
- Swales
- Detention basins
- Oil Separators

3.28. The proposed drainage strategy aims to mimic the existing conditions across the

site with 10 separate outfalls proposed which will restrict flows at or below the existing discharge rates. Four separate outfalls will discharge north via the existing railway culverts. The remaining six outfalls will discharge south to the diverted watercourse.

3.29. Outfall 1 in the north western corner of the development will discharge at a rate of 10.7l/s which is the calculated greenfield runoff rate from the area of this catchment that is to be redeveloped. Due to the site proposals and anticipated levels the proposed contributing impermeable area to this outfall exceeds the area of the existing catchment, hence there is a requirement to depart from the pro-rata based approach outlined previously. Based on the current measured impermeable area and a discharge rate of 10.7l/s the required attenuation volume has been calculated to be approximately 7,800m^3 for this catchment. A separate source control calculation is included within **Appendix 8**.

3.30. Similar to Outfall 1, it will be necessary to over attenuate the flows discharging via Outfall 3. The existing runoff rate to this area has been calculated to be 46.1l/s and the estimated impermeable area from Unit 08 is 11.9ha, based on these parameters the required attenuation volume has been calculated to be approximately 8,050m^3. A separate source control calculation is included withing **Appendix 8**.

3.31. At present, it is expected that the internal highways drainage will be served by a network of dedicated ponds / swales which have been indicatively sized and shown on the concept drainage layout.

3.32. Plot catchment specific discharge rates and attenuation volumes, at the time of writing, are shown on the proposed drainage plan. It is anticipated that these will be reviewed as the development proposals progress through detailed design. No one outfall from the proposed development should exceed that of the existing rate, based on the existing runoff calculations the overall discharge rate should not exceed 788.3l/s.

3.33. In accordance with Table 26.2 of the CIRCA SuDS Manual, the Main HNRFI Site would present areas of medium and high pollution risk. The use of permeable paving, swales and detention basins will be sufficient to cover the area of medium risk, prior to discharge to the surrounding catchment. Due to the nature of the development, it is expected that the use of oil separators will be required to cover the pollution risk from the higher risk areas of the site.

A47 Link Road

3.34. A concept surface water drainage layout for the Main HNRFI Site is shown on BWB Dwg No. HRF-BWB-EWE-ZZ-DR-CD-00501.

3.35. It has been estimated that the new link road will introduce circa 2.06ha of

impermeable area. The equivalent greenfield runoff rate would equate 8.4l/s for the entire Link Road. In order to avoid impractically low flow rates for some portions of the road, the total discharge rate has been split equally between each of the proposed outfalls. A summary of the existing and proposed flow rates has been included within **Table 3.4**.

Table 3.4: Runoff Rate Comparison (A47 Link Road)

Catchment	Measured Impermeable Area (ha)	Existing Average Runoff Rate (l/s) based on 4.1 l/s/ha	Proposed Discharge Rate (l/s)
Link Road South	0.65	2.6	2.8
Link Road Central	0.58	2.4	2.8
Link Road North	0.83	3.4	2.8
Total	2.06	8.4	8.4

3.36. The subsequent attenuation requirements for each of the proposed detention basins has been calculated using Micro Drainage 'Source Control' based on the above discharge rates, measured impermeable area and the 100 year + 25% storm event. Sensitivity testing shows that the 100 year + 40% event would be contained within the proposed freeboard of each basin. The results are summarised in **Table 3.5** and calculations are included as **Appendix 8**.

Table 3.5: Outline Attenuated Storage Requirements (A47 Link Road)

Catchment	Critical Storm	Maximum volume (m^3)
Link Road South	600 min Winter	415
Link Road Central	600 min Winter	365
Link Road North	720 min Winter	560

3.37. The Proposed Link Road will cross three existing minor watercourses, as such it will be necessary to design and install appropriately sized culverts to not impede or restrict the passage of the existing flows within the channel.

3.38. In accordance with Table 26.2 of the CIRCA SuDS Manual, the proposed link road would represent a Medium pollution risk. In accordance with Table 26.3, the use of detention basins would be sufficient to mitigate the pollution risk of proposed Link Road. If the highways adopting body would require interceptors to be incorporated into the design, then this should be considered through detailed design.

3.39. Due to the low discharge rates, it will be necessary to consider appropriate measure to avoid the passage of silt and debris to avoid potential blockages at the outfall.

M69 Junction 2

3.40. A concept surface water drainage layout for the Main HNRFI Site is shown on BWB Dwg No. HRF-BWB-EWE-ZZ-DR-CD-00505.

3.41. The proposed slip roads will introduce additional impermeable areas that will naturally drain south, back towards the M69. The existing drainage infrastructure serving the M69 is shown to discharge to an unnamed watercourse adjacent to the motorway approximately 700m southwest of the existing Junction 2 roundabout.

3.42. It is expected that water from the proposed slip roads will drain via a series of filter drains. The western slip road is likely to discharge via the existing drainage network and the eastern slip road could potentially connect directly into the watercourse (current outfall) or via the existing drainage network. Flow rates will need to be agreed with Highways England to determine the existing capacity and the requirements for any additional attenuation.

3.43. Given the expected traffic volume, this area of the development is expected to present a high pollution hazard, to support the drainage design and assess the downstream water quality implications, a Highways England Water Risk Assessment Tool (HEWRAT) has been undertaken and is included as **Appendix 10**. In summary, the proposed slip roads are shown to meet the criteria set out within HEWRAT.

Offsite Highway & Footpath Works

3.44. Traffic modelling has identified that upgrade works are required on various parts of the highway network in the vicinity of the development.

3.45. All of the development sites will be within or form part of the adopted highway, managed and maintained by the local highways authority. None of the proposals change the character or use of the existing highways, nor is it likely to have significant impacts in terms of the existing drainage.

3.46. As the new impermeable areas will be comparatively small, it is thought likely that the existing drainage infrastructure will be suitable to serve these areas. This should be considered further through the detailed design of each of these sites.

Residual Risk and Designing for Exceedance

3.47. It is recommended that the final layout uses the proposed road infrastructure, service yards and car parking areas to provide drainage exceedance events. Levels should be designed to provide flow routes to the nearest attenuation structures and outfall locations.

3.48. In addition to the volume of storage provided within the main attenuation, there will be capacity within upstream pipes and manholes which has not been accounted for at this stage and a further level of redundancy to the network will therefore be provided.

4. MAINTENANCE

Main HNRFI Site

4.1. It is envisaged that the majority of the Main HNRFI Sites highways and therefore drainage will remain private and as such should be undertaken by the site operator or a suitably appointed management company.

4.2. Requirements for ongoing maintenance of the drainage network for specific plots should form part of the Operation and Maintenance manual for the site and should be undertaken by the site management. Any specialist or proprietary products that are specified at detailed design should have a manufacturer specific maintenance regime which should be included within the document.

4.3. It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage and prior to occupation, but some examples for maintenance activities are included below.

- All drainage features should be located in open areas which are readily accessible.
- Gullies should be inspected and de-silted at least once a year, where necessary.
- Pipes, manholes and silt traps should be inspected and de-silted at least once a year, where necessary.
- If permeable paving is incorporated within the layout, it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.
- The surface water attenuation areas will be predominantly dry and the base will be seeded with a wildflower grass seed mix that can tolerate wet ground conditions.
- Regular inspections of the attenuation basin should be undertaken to remove litter/debris, invasive/colonising vegetation and silt build up as necessary. Inlet and outlet structures to be regularly inspected, with remedial work as required to maintain water flows and prevent silt/vegetation build up.
- Vegetation/grass with the attenuation basin should be maintained appropriately to allow establishment and promote habitat formation, without impeding the operation of the inlet and outlet structure.
- The below ground tank should be regularly inspected and jetted, as appropriate, to remove silt and debris.

- Hydro-brakes should be inspected every 6 months, litter/debris and silt build up should be removed as necessary.

A47 Link Road

4.4. It is anticipated that the drainage associated with the link road will be offered for adoption with the Local Highways Authority who will then be responsible for the ongoing maintenance.

M69 Junction 2

4.5. It is anticipated that the drainage associated with the new slip roads will be offered for adoption with National Highways who will then be responsible for the ongoing maintenance.

5. Foul Water Drainage

5.1. The Main HNRFI Site is the only part of the development that will require new foul drainage infrastructure. Severn Trent Water have been approached via their Pre-Development Enquiry process, their response is included as **Appendix 11** and identifies the need to upgrade the existing network to accommodate the anticipated foul flows from the development.

5.2. Due to the Sites topography and distance to the nearest public foul water drainage it will be necessary to pump flows from the development, the nearest point of connection is the foul sewer within Burbage Common Road to the northeast.

5.3. As discussed within Section 2 there is an existing Severn Trent Water foul rising main crossing the north-western corner of the site, it will be necessary to divert this main to accommodate the site proposals.

5.4. A concept foul water drainage layout for the Main HNRFI Site is shown on BWB Dwg No. HRF-BWB-EWE-ZZ-DR-CD-00502 which is included as **Appendix 12.** The point of connection, indicative route for the rising main diversion and potential location for the proposed pumping station is identified on the drawing although the exact proposals should be determined through detailed design.

Plot 16

5.5. A septic tank is located within Plot 16 shown on Land Plan Sheet 1 of 8, which is understood to be receiving foul water drainage from the adjacent residential dwellings on Burbage Common Road, Ramallah House and Dunton Cottage. Plot 16 is unregistered and has been included in the compulsory acquisition sought to ensure that the Applicant has control and is able to resolve (in the event that this isn't done outside of the DCO by others) what is understood to be a potential pollutant cess pit which has potential discharge effects on plot 15. The Applicant then intends to transfer to the purported owners who are seeking registration at HM Land Registry at the moment. If this is registered then the Applicant will continue its engagement with the purported owners to ensure the issue is resolved but in that case wouldn't intend to acquire the land from those owners.

6. SUMMARY

6.1. This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

6.2. Proposed discharge rates should be set on a prorated basis of 4.1l/s/ha which equates to the equivalent greenfield QBAR rate, total discharge rates should not exceed that of the calculated total greenfield discharge rate for any given outfall.

6.3. Attenuation volumes have been set at 650m^3 per drained impermeable hectare, based on preliminary calculations. Final volumes should consider all aspects of the drainage infrastructure and as such final volumes will be determined during detailed design.

APPENDICES

Appendix 1: Parameters Plan& Illustrative Layout

APPENDICES

Appendix 2: Topographical Survey

APPENDICES

Appendix 3: Existing Catchment Plan

APPENDICES

Appendix 4: Severn Trent Water Asset Records

APPENDICES

Appendix 5: Greenfield Runoff Rate Calculations

APPENDICES

Appendix 6: Greenfield Runoff Volume Calculation

APPENDICES

Appendix 7: Proposed Catchment Plan

APPENDICES

Appendix 8: Source Control Calculations

APPENDICES

Appendix 9: Concept Drainage Strategy Plans

APPENDICES

Appendix 10: HEWRAT

APPENDICES

Appendix 11: Pre-Development Enquiry Response

APPENDICES

Appendix 12: Concept Foul Drainage Strategy