Surface water and flood risk

One of a series of background topic papers prepared by db symmetry in support of a public consultation on proposals for a strategic rail freight interchange in Blaby district, to the north-east of Hinckley in Leicestershire.

INTRODUCTION

1. In 2019 db symmetry will apply to the government for a Development Consent Order (DCO) for a proposed strategic rail freight interchange (SRFI) on a site in Blaby District, to the east of Hinckley in Leicestershire. The project is known as the Hinckley National Rail Freight Interchange (HNRFI).

2. A DCO is a special form of planning permission for large infrastructure projects. It can include a range of additional powers required to implement the proposals, such as powers to acquire land, undertake works to streets, trees and hedgerows and divert utility services.

3. This topic paper provides an update on db symmetry's assessment of the potential impact of the proposed Hinckley National Rail Freight Interchange on water resources, particularly surface water and flood risk, and includes an assessment of the potential cumulative impact of the land within the Draft DCO Boundary in combination with other surrounding significant proposed developments. The topic paper has been prepared by consultant Hydrock.

4. Relevant legislation, policies and guidance have been summarised, along with an outline of: the existing water resource conditions at the site; the proposed approach to undertaking the Environmental Impact Assessment (EIA) in respect to water resources; the likely effects of the proposals on water resources; the mitigation measures proposed to reduce, offset and address any potential adverse effects anticipated; and, further work planned in order to inform our assessment.

LAW, POLICY AND GUIDANCE

5. The following summarises planning and environmental legislation, policies and guidance which are considered relevant to water resources in relation to the proposed development, and accordingly will be referenced and consulted in the undertaking of the

EIA process.

European Directives

6. Directive 2000/60/EC of the European Parliament and of the Council establishing a Framework for the Community Action in the field of Water Policy (European Commission, 2000) - the Water Framework Directive (WFD) applies to all European Union (EU) waterbodies and aims to ensure their protection from further deterioration, and that improvements in water quality are made. The assessment and protection of waterbodies is undertaken by implementing River Basin Management Plans. In general terms, there is an onus on developers to protect and, if possible, enhance waterbodies close to proposed developments.

7. Directive 2007/60/EC of the European Parliament and of the Council on the Assessment and Management of Flood Risks (European Commission, 2007) - the Flood Directive requires EU Member States to assess whether watercourses and coastlines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas, and to take adequate and coordinated measures to reduce this flood risk. The Directive requires Member States to carry out an assessment of flood risk and produce Flood Risk Management Plans that focus on prevention, protection and preparedness. The current Plan relevant to the land within the Draft DCO Boundary is the Humber River Basin District Flood Risk Management Plan 2015 - 2021.

8. Whilst the implications on European environmental legislation is currently unclear post-Brexit, it is intended that any subsequent / replacement legislation be referenced and consulted in the undertaking of the EIA process; or, if not in place, the current legislation continue to be adopted as far as possible, where appropriate.

National law, policy and guidance

9. Land Drainage Act (1991 and 1994) - this Act sets out the responsibilities given to Statutory Authorities and riparian landowners in regard to land drainage. Under the Act, Statutory Authorities have discretionary powers of management and maintenance for 'Main Rivers' and 'Ordinary Watercourses' respectively. However, it is the riparian owner, i.e. the owner of the land through which a watercourse flows, who is ultimately responsible for maintaining the relevant section of the watercourse in such condition that the free flow of water is not impeded.

10. Water Industry Act (1991) - this Act consolidates previous legislation on water supply and sewerage services and covers a wide range of activities required of privatised water companies, such as Severn Trent Water. The main relevant provisions relate to the discharge of trade effluent to the public sewer for which privatised companies act as the regulatory authorities.

11. Environment Act (1995) - this Act established the Environment Agency, and transferred to it powers over the control of pollution and the conservation and enhancement of natural resources and the environment.

12. Water Act (2003) - this Act consolidates previous legislation and brings about several changes, including streamlining arrangements for flood defence organisation and funding,

changes to the types of abstraction licence, and places a duty on water companies to conserve water and prepare for drought.

13. Design Manual for Roads and Bridges (2009) - volume 11, section 3, part 10 refers to 'road drainage and the water environment' and gives guidance on the assessment and management of the impacts that road projects may have on the water environment. These include possible impacts on the quality of water bodies and on the existing hydrology of the catchments through which roads pass.

14. Water Resources Act (as amended 2009)- this Act relates to the control of the water environment. The main aspects of the Act which are relevant to the site include provisions concerning land drainage, flood mitigation and controlling discharges to watercourses to prevent water pollution. It also outlines the functions and responsibility of the Environment Agency in regulating the water environment.

15. Flood and Water Management Act (2010) - this Act places a series of responsibilities on County and Unitary Councils as Lead Local Flood Authorities (LLFAs) with the intention of improving flood risk management. It also removes the automatic right of connection into public water sewers and places the onus on Local Authorities to adopt Sustainable Drainage Systems (SUDS).

16. Sewers for Adoption 7th Edition (WRc, 2012) - this guidance specifies the design and construction of sewers that will be adopted by Sewerage Undertakers, such as Severn Trent Water, in England and Wales.

17. National Planning Policy Framework Planning Practice Guidance (2014) - this guidance document translates the policies in the NPPF into practices applicable at all stages of the planning process, including for individual planning applications. Of note are policies regarding the risk-based approach to the location of development; guidance relating to the undertaking of a site-specific FRA; and, the definition of Flood Zones, land use vulnerability classifications, and their 'compatibility'.

18. National Policy Statement for National Networks (Department for Transport, 2014) specifically paragraphs 5.90-5.115 (related to flood risk) and 5.219-5.231 (related to water quality and resources). The document includes the requirements to: 'take into account the potential impacts of climate change'; ensure that 'potential releases can be adequately regulated under the pollution control framework' and, 'the effects of existing sources of pollution in and around the project are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable'; undertake an appropriate assessment of flood risk, in accordance with the requirements of the 'National Planning Policy Framework' in order to 'avoid, limit and reduce the risk of flooding to the proposed infrastructure and others'; and, assess potential impacts on water quality, water resources, physical characteristics of the water environment, and water bodies or protected areas under the Water Framework Directive.

19. The Building Regulations, Approved Document H: Drainage and Waste Disposal (2015) - this gives guidance for compliance with the Building Regulations for drainage and waste disposal building work carried out in England.

20. Non-Statutory Technical Standards for Sustainable Drainage Systems () - these standards specify the design, maintenance and operation of SUDS to drain surface water.

21. The SUDS Manual (2015) - this provides best practice guidance on the planning, design, construction, operation and maintenance of SUDS to facilitate their effective implementation within developments.

22. Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) - this transposes the requirements of the WFD into UK law. 11 River Basin Districts have been identified in England and Wales, of which the site falls within the Humber River Basin District. The Regulations include a requirement for surface water bodies to achieve 'good' status with respect to ecology and water chemistry by 2021. Progress is monitored by the Environment Agency in its role as the 'competent authority'. The current plan relevant to the land within the Draft DCO Boundary is the Humber River Basin District River Basin Management Plan 2015 - 2021.

23. National Planning Policy Framework (2018) - the NPPF requires that flood risk is considered at all stages in the planning process. Key guidance states that 'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere'. The NPPF advocates the adoption of the Sequential and Exception Tests to steer new development to areas with the lowest probability of flooding, and, to ensure that the proposed development will be safe for its lifetime, without increasing flood risk elsewhere.

County and local policy and guidance

24. Blaby District Local Plan (Blaby District Council, 2013) - the key relevant policies from the Local Plan in relation to water resources and flood risk, comprise: CS21 (Climate Change) and CS22 (Flood Risk Management). Amongst other aims, such policies require proposed developments to: minimise the risk of flooding to property, infrastructure and people; minimise vulnerability and provide resilience to climate change and flooding by including adaptations such as appropriate shading and planting, green roofs, SUDS, rain water harvesting and storage, and, grey water recycling; be preferentially located in areas at lowest risk of flooding within the District; and, manage surface water run-off to minimise the net increase in the amount of surface water discharged.

25. Hinckley and Bosworth Borough Council, Blaby District Council and Oadby and Wigston Borough Council Joint Strategic Flood Risk Assessment (JBA Consulting, 2014) - the SFRA provides an overarching review of flood risk issues within the Council's area, along with recommended principles for guiding future development in respect of Flood Risk Assessment, flood mitigation measures, drainage systems and the water environment. It also provides evidence to support the Local Plan.

26. Local Flood Risk Management Strategy (Leicestershire County Council, 2015) - the Strategy explains the roles and responsibilities of local authorities, partners and communities in the management of flood risk in Leicestershire, and outlines a flood risk management 'action plan' for the County.

27. Hinckley and Bosworth Borough Council, Blaby District Council and Oadby and Wigston Borough Council Joint Strategic Flood Risk Assessment - Addendum (2017) - the Addendum provides an update to the 2014 SFRA, based on the latest information and

guidance.

28. Leicester City and Leicestershire Strategic Water Cycle Study (2017) - the Water Cycle Study has considered the cumulative impact of the anticipated overall level of growth within Leicestershire to 2050 on the provision of a clean water supply, the safe disposal of wastewater and protection from flooding. It has considered the implications of development in the potential growth areas to assess if large-scale development within these areas would be viable and sustainable in terms of impacts on the 'water cycle'.

29. Strategic Growth Plan, Leicester and Leicestershire 2050: Our Vision for Growth [draft] (2018) - the Strategic Growth Plan is the overarching Plan which will set out the aspirations for delivering growth (housing, economic, infrastructure) in Leicester and Leicestershire until 2050.

THE SITE

30. The following outlines the existing water resource conditions at the HNRFI site within the Draft DCO Boundary.

Hydrology

31. An unnamed stream flows north-eastwards through the southern portion of the site. A number of field drainage ditches and small ponds are also present within the site. These discharge into a tributary of the Thurlaston Brook to the north-east of the site, which in turn discharges to the River Soar.

Flood Risk

32. The Environment Agency's Flood Zone map (Figure 1) shows the majority of the site to be in Flood Zone 1 (land having a less than 1 in 1,000 annual probability of river flooding, i.e. low risk of flooding), with only a small portion of the site shown to be in Flood Zone 3 (land having a 1 in 100 or greater annual probability of river flooding, i.e. high risk of flooding), associated with the tributary of the Thurlaston Brook. However, this mapping does not take account of watercourses with a catchment area of less than 3km^2, which is the case with the on-site watercourses in this situation. Accordingly, we accept that the Environment Agency's Flood Zone map may not be fully representative of flood risk at the site.

33. As such, the Environment Agency's Flood Risk from Surface Water map (Figure 2) is considered a better representation of flood risk in this instance, as such mapping encompasses watercourses with a catchment area of less than 3km^2. The mapping shows various areas of the site to be at 'low', 'medium' and 'high' risk of surface water flooding. It is noted that the areas designated as Flood Zone 3 and as being at risk of surface water flooding correspond to the area highlighted by Burbage Parish Council and Sapcote Parish Council in their Scoping Opinion responses as being *'frequently waterlogged'*.

Figure 1: Environment Agency's Flood Zone Map

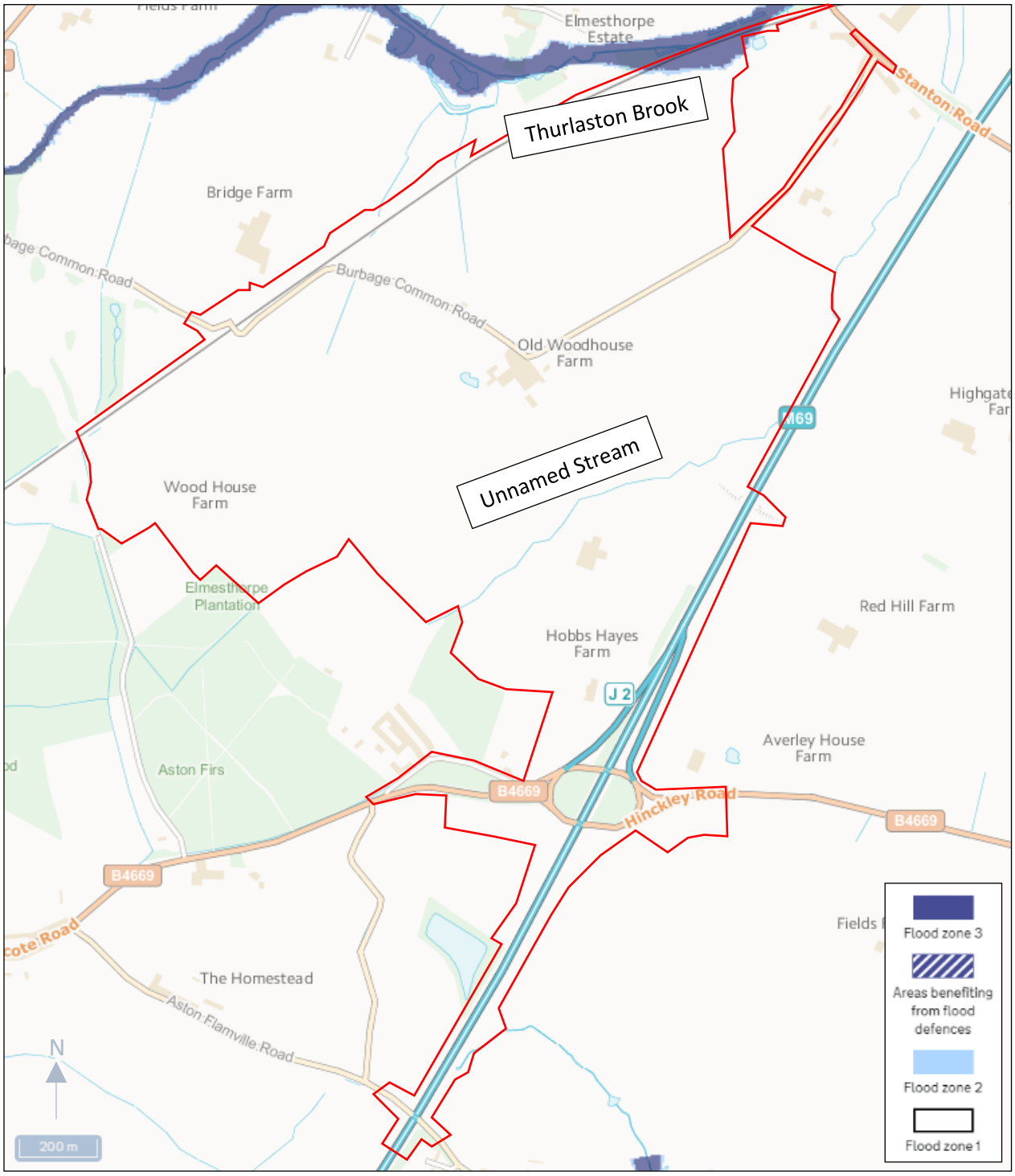
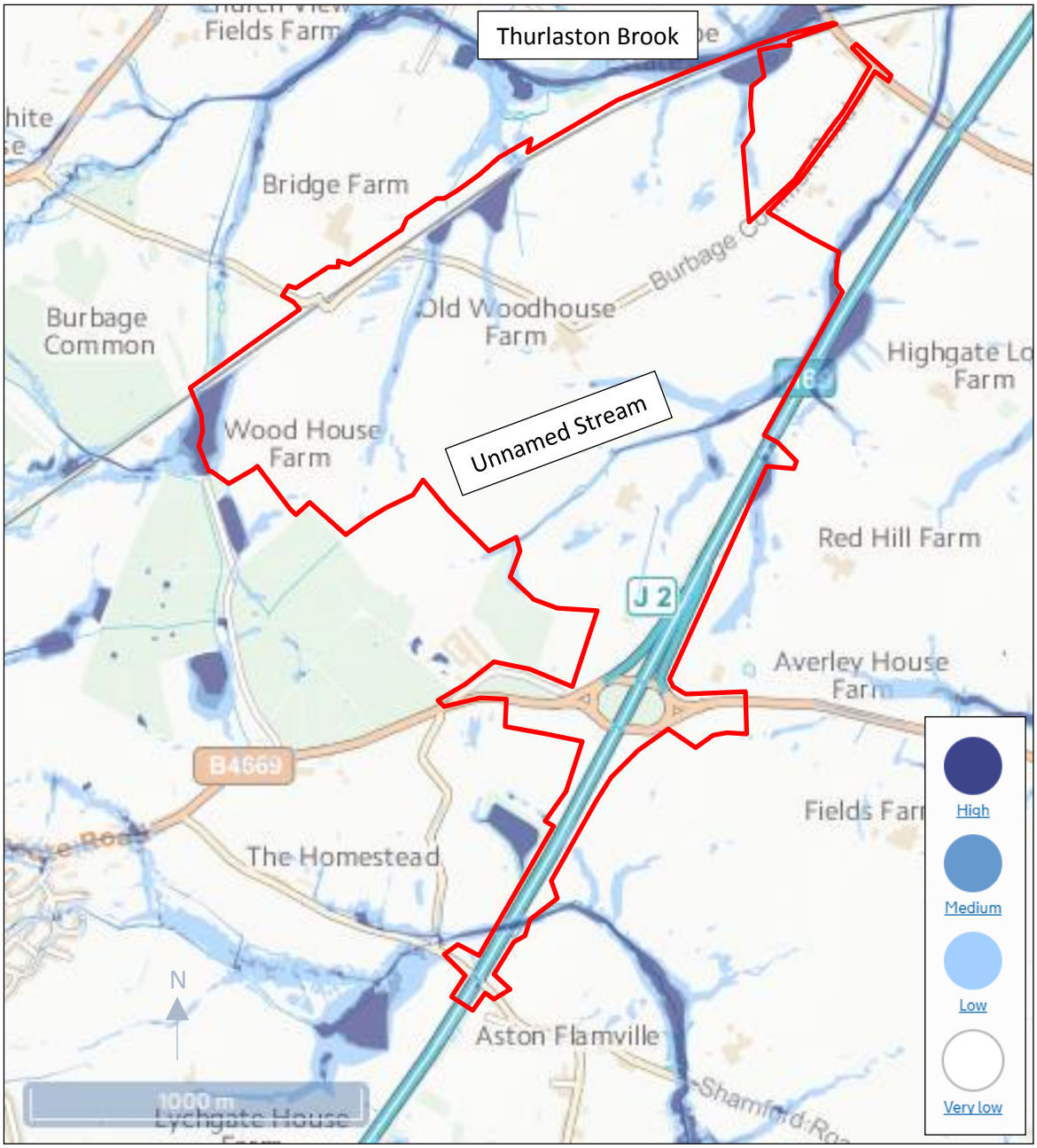


Figure 2: Environment Agency's Flood Risk from Surface Water Map



Surface water

34. The site is not currently believed to be served by a positive surface water drainage system, with rainfall assumed to infiltrate into the ground where geological and hydrogeological conditions allow, and then run-off at surface level once the infiltration capacity of the ground has been exceeded. Any run-off currently generated will likely be directed to existing on-site surface water bodies, and ultimately into the tributary of the Thurlaston Brook.

35. The site is split approximately in half by a ridge running south-west to north-east. The area to the north of the ridge drains towards the railway line to the north, leaving the site

by means of several culverts crossing under the railway line. Surface water run-off from the southern portion of the site is collected in an unnamed stream which flows north-eastwards through the site until it reaches the site boundary with the M69. It then runs along the motorway boundary for a length of approximately 280m before leaving the site and continuing northwards, roughly parallel to the line of the motorway.

36. Where the unnamed stream flows parallel to the M69, a 975mm diameter pipe crossing under the motorway discharges into the stream. It is unclear at this stage whether the pipe conveys highway drainage from the motorway and/or land drainage from the other (eastern) side of the motorway.

Water quality

37. The Thurlaston Brook catchment is subject to Water Framework Directive ratings. This is a European Union (EU) directive which commits EU member states to achieve 'good' qualitative and quantitative status of all water bodies, with ratings of 'high', 'good', 'moderate', 'poor' or 'bad'. Currently it has an overall water body quality classification of 'poor', with an ecological status of 'poor' and a 'good' chemical status. The catchment has an objective of achieving 'good' overall and ecological statuses by 2027.

Foul water

38. The site is located within Severn Trent Water's sewerage area, though is not currently believed to be served by a positive foul water drainage system, with foul water from existing properties within the site understood to currently be disposed to on-site management / disposal systems.

Potable water supply

39. Potable water is supplied to the area by Severn Trent Water. The Environment Agency classifies the Severn Trent Water region as having a 'moderate' degree of 'water stress', on a scale of 'low', 'moderate' and 'serious' stress.

OUR APPROACH TO ASSESSMENT

Scoping opinion

40. Table 1 summarises the responses received as part of the EIA Scoping Opinion from those consultation bodies interested in the assessment of the potential impact of the proposed Hinckley National Rail Freight Interchange on water resources, and/or other consultees who have raised the topic of water resources within their response.

Table 1: Scoping Opinion Responses.

Consultee	Scoping Opinion Response
Blaby District Council	No mention of water resources.
Burbage Parish Council	Highlighted previous waterlogging at site. Requested assessment *'of the impact of increased flooding on local watercourses'*.

Elmesthorpe Parish Council	Highlighted previous surface flooding at site. Concerns raised regarding potential increase of off-site flooding. Requested assessment of the *'impact of the development in terms of flood risk, surface water quantity and … quality, on the Thurlaston Brook, its tributaries and surrounding land, not simply the development site'*.
Environment Agency	Agreed with specific receptors proposed to be scoped in to the EIA assessment and the level of detail stated.
Highways England	Noted that any changes to the existing means of surface water drainage adjacent to the M69 to be agreed with Highways England.
Leicestershire County Council - Lead Local Flood Authority (LLFA)	No mention of water resources.
Public Health England	Requested *'assessment of potential impacts on human health'* from any *'emissions to water'*.
Sapcote Parish Council	Highlighted previous waterlogging at site. Concerns raised regarding potential increase of off-site flooding. Requested assessment of the potential impact on off-site flooding and water quality.
Severn Trent Water	No response received.

Assessment approach

41. Acknowledging comments received as part of the Scoping Opinion response, and in accordance with the guidance provided in the National Policy Statement for National Networks, we propose that the 'Surface Water and Flood Risk' Chapter of the EIA will assess the likely significant effects of the proposed development on the following receptors:

- Flood Risk.
- Surface Water - Quantity.
- Surface Water - Quality.
- Foul Water - Quantity.
- Foul Water - Quality.
- Potable Water Supply.

42. The following outlines the proposed means of assessment for each receptor, in turn.

Flood risk

43. A Flood Risk Assessment is being prepared that will consider potential fluvial, tidal, surface water, groundwater and infrastructure failure sources of flood risk.

44. The assessment is informed by a desktop assessment of available information, a site walkover survey, analysis of a Topographical Survey of the site, and (given that the flood risk posed by on-site ditches is considered likely to be the dominant source of potential flood risk) hydrological and hydraulic modelling.

45. Owing to the scale and nature of the site, detailed flood risk modelling is being undertaken to assess flood risk from the existing ditches and from rainfall. This will help determine the existing flood risk posed from these sources to the site, and the effect of the proposed development on flood risk on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries, and determine what measures, if any, will be required to mitigate the risks identified.

46. The modelling study includes an assessment of both the fluvial and surface water flood risks, for a range of 'extreme' flood / storm events, including an appropriate allowance for climate change.

47. The modelling is using standard approaches and 'industry standard' software, and will follow the standard requirements of the Environment Agency.

48. Any mitigation measures or post-development conditions will also be modelled to determine the impact on flood risk within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries.

49. Sensitivity testing will be undertaken to test the robustness of the modelling.

50. The potential effects of the proposed development will be assessed in terms of its potential to increase flood risk within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries, i.e. such as through the impedance of ditch drainage routes, impedance of overland flow routes and/or loss of floodplain storage. This proposed approach is in response to specific requests from various consultees raised as part of the EIA scoping opinion response.

Surface water - quantity

51. The existing surface water drainage regime at the site has been confirmed by means of a site walkover, review of a Topographical Survey of the site, and the gathering of drainage records. This revealed that the site currently drains in a generally south-west to north-east direction, dictated by the existing topography. The drainage records covering the area indicate that there are no surface water public sewers serving the site.

52. Industry standard calculations will be undertaken to determine pre- and post-development surface water run-off rates from the site.

53. The results of the flood risk modelling will be used to determine the potential effects of the post-development surface water run-off from the site, if unmitigated, on flood risk and surface water management both within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries.

Surface water - quality

54. Existing water quality within the catchment is being quantified via a desktop assessment of available information. Potential risks posed by the construction and operation of the proposed development to water quality will be identified (specifically in relation to ecology, chemistry and human health).

Foul water - quantity

55. The existing means of foul water drainage at the site has been confirmed by inspection of the drainage records and discussions with Severn Trent Water. Whilst there are no public foul sewers available for a connection within the site, Severn Trent Water has indicated a potential connection point approximately 100m outside the site boundary, to the north-east of the site.

56. Industry standard calculations will be undertaken to determine pre- and post-development foul water volumes generated at the site.

57. Consultation has taken place with Severn Trent Water in order to identify any potential infrastructure capacity issues. This will allow determination of the potential effects of the post-development foul water discharge from the site on foul water management both within the site, on the immediate surrounding area, and on the catchment of the receiving Sewage Treatment Works. Severn Trent Water has indicated that they will need to carry out Capacity Modelling to fully understand the anticipated loads on their network from the proposed development, and they have been requested to commence that modelling exercise.

Foul water - quality

58. Existing water quality within the anticipated receiving catchment has been quantified via a desktop assessment of available information. The standard of available foul water treatment infrastructure is being confirmed via consultations with Severn Trent Water and a desktop assessment of available information.

59. Potential risks posed by the discharge of foul water from the site to water quality will be identified (specifically in relation to ecology, chemistry and human health).

Potable water supply

60. The potential potable water demand as a result of the proposed development will be identified. The availability of potable water supply will also be confirmed via consultations with Severn Trent Water and a desktop assessment of available information.

61. On this basis, an assessment of the potential impact of such demand on water resource availability within the area / region will be undertaken.

Assessment approach

62. The proposed means of assessment for each receptor, summarised above, has been discussed and agreed with key consultation bodies. Their responses are summarised below in Table 2.

Table 2: Subsequent Consultation Responses from Key Consultation Bodies.

Consultee	Scoping Opinion Response
Blaby District Council	Response still awaited at the time of writing.
Environment Agency	Response still awaited at the time of writing.
Leicestershire County Council -	Response still awaited at the time of writing.

Lead Local Flood Authority (LLFA)	
Severn Trent Water	Response still awaited at the time of writing.

THE MAIN LIKELY EFFECTS OF THE PROPOSALS

63. The following outlines the potential effects of the proposed development within the Draft DCO Boundary on water resources, based on our understanding to date, and assuming that no mitigation measures are in place.

During Construction

Flood risk

64. Construction activities, such as the mounding of materials and placement of other structures within areas identified as being at risk of flooding; and, impedance of existing drainage / watercourse channels, could result in a loss of floodplain storage, and impedance of overland flow and drainage routes. This could inadvertently increase flood risk within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries.

65. In a worst-case scenario, the frequency, extent, depth and duration of flood risk within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries, could be increased.

Surface water - quantity

66. The construction of the proposed development will result in currently undeveloped permeable land being developed with the construction of buildings, highways and other hard surfaces. Consequently, assuming there was no mitigation, the volume of surface water run-off from the site could significantly increase compared to the baseline situation.

67. Such a scenario could increase the frequency, extent, depth and duration of surface water flood risk within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries, via surcharging water bodies and/or sewerage systems.

Surface water - quality

68. During construction, there is the potential for the generation of silty run-off, oil and other hydrocarbon pollutants from plant and other construction wastes. Such polluted run-off could be directed into existing waterbodies within the site.

69. As such, the construction and operation of the proposed development has the potential to adversely affect water quality in on-site and downstream water bodies.

Foul water - quantity

70. Significant volumes of foul water are unlikely to be generated during the construction of the proposed development, with any welfare facilities likely to be of a temporary nature. However, there will still be some foul water generated during the construction phase,

which if unmanaged, could increase the volume of discharge from the site compared to the baseline situation.

71. Such a scenario could increase the frequency, extent, depth and duration of flood risk within the site, on immediate surrounding land, downstream along the Thurlaston Brook and its tributaries, and within the catchment of the receiving Sewage Treatment Works, via surcharging water bodies and/or sewerage systems.

Foul water - quality

72. The absence and/or inadequacy of appropriate foul water conveyance and treatment infrastructure could result in the discharge of untreated / poorly treated foul water generated at the site which could in turn adversely affect water quality in on-site and downstream water bodies, and the catchment of the receiving Sewage Treatment Works to which the site will discharge.

Potable water supply

73. Potable water uses during the construction phase will include welfare facilities, construction activities (e.g. mortar silos, concrete mixing and internal wet trades etc.) and cleaning operations (e.g. wheel wash and road sweepers etc.). The construction of the proposed development will therefore involve the use and consumption of potable water, which has the potential to adversely affect water resource availability on a local and regional scale.

During operation

Flood risk

74. The proposed development of the site has the potential to increase flood risk within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries, through a loss of floodplain storage, and impedance of overland flow and drainage routes. Such scenarios could be caused through the inadvertent placement of buildings and structures within areas identified as being at risk of flooding; and, impedance of existing drainage / watercourse channels (again, assuming that no mitigation measures are in place).

Surface water - quantity

75. The proposed development will result in the creation of extensive hard surfaced and roof areas. Consequently, assuming there was no mitigation, the volume of surface water run-off from the site could significantly increase compared to the baseline situation.

76. Such a scenario could increase the frequency, extent, depth and duration of surface water flood risk within the site, on immediate surrounding land, and downstream along the Thurlaston Brook and its tributaries, via surcharging water bodies and/or sewerage systems.

Surface water - quality

77. The creation of extensive hard surfaced areas, as a result of the proposed development,

has the potential to generate contaminated run-off, in the form of suspended solids and hydrocarbons.

78. As such, the operation of the proposed development has the potential to adversely affect water quality in on-site and downstream water bodies.

Foul water - quantity

79. The proposed development will result in the generation of foul water. Consequently, assuming there was no mitigation, the volume of foul water discharge from the site could significantly increase compared to the baseline situation.

80. Such a scenario could increase the frequency, extent, depth and duration of flood risk within the site, on immediate surrounding land, downstream along the Thurlaston Brook and its tributaries, and within the catchment of the receiving Sewage Treatment Works, via surcharging water bodies and/or sewerage systems.

Foul water - quality

81. The absence and/or inadequacy of appropriate foul water conveyance and treatment infrastructure could result in the discharge of untreated / poorly treated foul water generated at the site which could in turn adversely affect water quality in on-site and downstream water bodies, and the catchment of the receiving Sewage Treatment Works to which the site may discharge.

Potable water supply

82. The proposed development will involve the use and consumption of potable water, through the provision of welfare facilities and 'normal' operational activities. This has the potential to adversely affect water resource availability on a local and regional scale.

PROPOSED APPROACH TO MITIGATION

83. The following outlines the potential mitigation measures which may need to be incorporated into the design, construction and operation of the proposed development, based on our identification of potential adverse effects to date. Further measures may be required if through the EIA process other currently unforeseen potential effects are identified.

Flood risk

84. Measures will be proposed to ensure that flood risk will not be increased on- or off-site (i.e. through the impedance of ditch drainage routes and/or loss of floodplain storage). Such mitigation is likely to include the retention / diversion of existing ditches (with appropriate easements provided) and the provision of floodplain compensation (i.e. the lowering of ground levels to compensate for any loss of floodplain storage elsewhere within the site as a result of ground raising or development) to ensure there is a net balance of floodplain storage within the site post-development compared to the existing baseline situation.

Surface water - quantity

85. A Surface Water Drainage Strategy will be prepared for the site in line with current best practice and Sustainable Drainage System (SUDS) principles. A prime objective of the Drainage Strategy is to ensure that surface water flood risk is not increased, and ideally reduced, as a result of the proposed development both within the site, on immediate surrounding land, or downstream along the Thurlaston Brook and its tributaries, via surcharging water bodies and/or sewerage systems.

86. SUDS encompass a range of techniques for managing rainfall on-site to take account of water quantity (flooding), water quality (pollution), biodiversity (wildlife and plants) and amenity.

87. SUDS aim to mimic the 'natural' drainage regime and typically manage rainfall close to where it falls ('source control'). SUDS can be designed to convey surface water; slow run-off (attenuate) before it enters watercourses and/or sewers; provide areas to store water in natural contours; and, allow water to soak (infiltrate) into the ground, evaporate from areas of open water, and be lost or transpired from vegetation (evapotranspiration).

88. SUDS are drainage systems that are considered to be environmentally beneficial, causing minimal or no long-term detrimental damage. They are often regarded as a sequence of management practices, control structures and strategies designed to efficiently and sustainably drain surface water, while minimising pollution and managing the impact on water quality of local water bodies.

89. SUDS are more sustainable than 'traditional' drainage methods because they can:

- manage run-off volumes and flow rates from hard surfaces, reducing the impact of development on flooding;
- provide opportunities for reusing rainfall (rainwater harvesting);
- protect or enhance water quality (reducing pollution from run-off);
- retain 'natural' flow regimes in watercourses;
- provide an attractive habitat for wildlife;
- provide opportunities for evapotranspiration from vegetation and surface water bodies;
- encourage natural groundwater / aquifer recharge, where appropriate; and
- create better places to live, work and play.

90. The primary means of SUDS provision for the proposed development is anticipated to be individual attenuation basins within or adjacent to the various development plots. These ponds will be designed to be almost empty most of the time, and have a small diameter outlet pipe which allows only a very limited flow rate from them into the new site drainage system. During a rainfall event, the ponds will gradually fill with the incoming rainwater run-off from buildings, car parks, highways and service yards etc.

91. The ponds will be designed to be large enough to hold all the surface water for an 'extreme' storm event, one that might occur once in every 100 years (a 1 in 100 year storm

event). An additional allowance is made for the anticipated effects of climate change on rainfall patterns. For developments of this type, this is typically a further 20%, over and above the volumes and rainfall intensities predicted for the 1 in 100 year storm event. Following a single or series of storm events, the ponds gradually drain through small outlet pipes at a controlled rate, which might take several hours or in some cases days.

92. Once released from the attenuation ponds, surface water will be conveyed from the site to the existing ditches at the site boundary, at limited flow rates, as per the existing 'natural' regime. The design for this proposed development will use a network of swales, rather than a conventional piped system for this purpose. Swales are wide shallow ditches, planted with reeds and other vegetation, which will meander through the landscaped corridors of the proposed development, creating an attractive, natural looking feature, and also creating habitats and encouraging ecology and biodiversity.

Surface water - quality

93. Pollution control is of vital importance for all phases of the proposed development. As part of the application, a detailed Construction Environmental Management Plan (CEMP) will be prepared in response to a Development Consent Order 'Requirement' (similar to a planning condition that would apply to a conventional grant of planning permission), for approval by Blaby District Council. This will include measures to prevent silts, oils, and other construction wastes from causing pollution, and will be enforced by Building Control and other regulatory bodies as appropriate.

94. The proposed Surface Water Drainage Strategy for the site will include pollution control in the form of oil separators, which capture and contain any fuel or oil spillages from vehicles using the development, allowing it to be disposed of safely. The separators include alarms and telemetry to indicate when they are almost full, and are regularly maintained. The proposed swales will also be vegetated, which will help to remove silts and other pollutants from the storm water discharge from the site.

Foul water - quantity

95. A Foul Water Drainage Strategy will be prepared for the site in line with current best practice.

96. The Strategy will be subject to discussions and agreement with Severn Trent Water, as the body responsible for foul water management, but will likely include a new below ground sewer system which will convey foul water to the existing Severn Trent Water sewer system and hence to the Sewage Treatment Works. If necessary, the system will incorporate an on-site Foul Pumping Station to ensure foul water can be discharged to the Severn Trent Water sewer network.

97. Any identified off-site infrastructure capacity issues, following consultation with Severn Trent Water, will also be discussed and addressed / mitigated in collaboration with Severn Trent Water (such as the upgrading of off-site sewers and/or receiving Sewage Treatment Works).

Foul water - quality

98. Assuming that foul water from the site will be discharged to the existing Severn Trent Water sewer system and hence Sewage Treatment Works, additional mitigation will only be necessary if the receiving Sewage Treatment Works is unable to provide treatment to current standards, or is undersized to accommodate the anticipated additional foul water discharge from the site, thereby resulting in the discharge of untreated / poorly treated foul water.

99. If such issues are identified, these will be discussed and addressed / mitigated in collaboration with Severn Trent Water. This will follow the results of Severn Trent Water's internal Capacity Modelling exercise (described in paragraph 56 above).

Potable water supply

100. Irrespective of the nature and scale of the potential effect identified, measures are likely to be proposed to limit potable water demand, use and wastage wherever practicable, in order to reduce the impact of the proposed development on water resource availability. Such measures may include the installation of water efficient welfare devices, and landscaping and open space areas designed to be low water use.

101. Any necessary off-site reinforcement works to ensure the existing infrastructure is sufficient to supply the proposed development will also be agreed in collaboration with Severn Trent Water.

NEXT STEPS

102. In order to progress the ongoing assessment of the potential impact of the proposed Hinckley National Rail Freight Interchange on water resources, particularly surface water and flood risk, the following future work is proposed.

- Continue to undertake EIA assessment, with ongoing consultation, discussions and agreements being sought with relevant consultees.
- Prepare a Flood Risk Assessment which will include flood risk modelling.
- Produce a detailed Surface Water Drainage Strategy for the site.
- Formulate a Foul Water Drainage Strategy for the site, in collaboration with Severn Trent Water.

Hydrock ◆ October 2018