HS2

Land drainage

This factsheet describes the approach taken to land drainage issues during the preliminary design of the Proposed Scheme and the further measures expected to be taken during detailed design, construction and operation of the Proposed Scheme.

Version 3.0

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1 Introduction

1.1.1 High Speed Two (HS2) is the Government's proposal for a new, high speed north-south railway. The proposal is being taken forward in phases. Phase One will connect London with Birmingham and the West Midlands. Phase 2a will extend the route to Crewe. The Western Leg of Phase 2b comprises an extension of the network to Manchester and a connection to the West Coast Main Line at Golborne, and is referred to as the Western Leg hybrid Bill. The Eastern Leg of Phase 2b currently comprises an extension of the network from the West Midlands through the East Midlands to Leeds.

1.1.2 HS2 Ltd is the non-departmental public body responsible for developing and promoting these proposals. The company works to a Development Agreement made with the Secretary of State for Transport.

1.1.3 The construction and operation of Phase One of HS2 is authorised by the High Speed Rail (London – West Midlands) Act (2017). In July 2017, the Government introduced a hybrid Bill to Parliament to seek powers for the construction and operation of Phase 2a.

1.1.4 In February 2020, the Government announced its intention to draw up an Integrated Rail Plan. This will recommend a way forward on scoping, phasing and sequencing the delivery of HS2 Phase 2b, Northern Powerhouse Rail, Midlands Rail Hub and other proposed rail investments across the north. At the same time, the Government asked HS2 Ltd to prepare the Western Leg hybrid Bill, provided it does not prejudge any recommendations or decisions that will be taken in this plan, which will be published by the end of the year.

1.1.5 It is intended to deposit a Western Leg hybrid Bill seeking powers to construct and operate this phase in Parliament in early 2022 or sooner if possible (the Proposed Scheme). The work to produce the Bill will include an Environmental Impact Assessment (EIA), the results of which will then be reported in an Environmental Statement (ES). The ES would be submitted alongside the Bill when it is introduced to Parliament. As was the case with Phase One and Phase 2a, when the Bill is introduced to Parliament the Secretary of State will also publish draft Environmental Minimum Requirements (EMRs). The EMRs will set out the environmental and sustainability commitments that will be observed in the construction of the Proposed Scheme.

1.1.6 A series of information papers were produced for the Phase One and Phase 2a hybrid Bills, explaining the commitments made in those Bills and EMRs. It is the Secretary of State's intention to follow a similar process for the Western Leg Bill. These information papers will be used to provide information about the Proposed Scheme itself, the powers contained in the Bill and how decisions on

the Proposed Scheme have been reached. It is currently proposed that these information papers for the Western Leg of Phase 2b will be published at the time the Bill is introduced in Parliament.

1.1.7 The Secretary of State for Transport will be 'the Promoter' of the Western Leg Bill. The Promoter will also eventually appoint a body responsible for delivering the Proposed Scheme under the powers to be granted by the Bill. This body will be known as the 'nominated undertaker'. There may well be more than one nominated undertaker. However, any and all nominated undertakers will be bound by the obligations contained in the Bill, the policies established in the Western Leg EMRs and any commitments provided in the Western Leg information papers.

1.1.8 These Western Leg factsheets have been produced to provide information on the emerging proposals for measures to manage the design process for the Proposed Scheme and to control impacts which may arise from the construction and operation of the Proposed Scheme. These measures may then be applied to the Western Leg as commitments made through the eventual Bill, EMRs or information papers.

2 Overview

2.1.1 This factsheet describes the approach that will be taken to land drainage issues during the preliminary design of the Proposed Scheme and the further measures that are expected to be to be taken during detailed design, construction and operation of the Proposed Scheme.

2.1.2 The Proposed Scheme includes several types of earthworks which could affect land drainage. These will be shown within the Environmental Statement and include:

- structural earthworks (i.e. cuttings and embankments) which are constructed as part of the Proposed Scheme;
- a wide variety of landscape earthworks to help mitigate the visual impacts of the Proposed Scheme that would otherwise arise during and/or after the construction; and
- borrow pits (for further information on borrow pits, please see Phase 2b Western Leg Factsheet: Borrow Pits).

2.1.3 In some locations, structural and landscape earthworks are likely to affect existing land drainage of agricultural and other land adjacent to the Proposed Scheme. Elsewhere, they are likely to alter the existing overland flow routes helping to drain surface water run-off from fields and areas of woodland, or change the slope of the land.

2.1.4 Additionally, any excavated material placed in landscape earthwork areas and borrow pits may have different water infiltration characteristics from those of the underlying geology (although the planned agricultural restoration measures would, so far as is reasonably practicable, seek to keep any differences to a minimum). Such water infiltration alterations may increase or decrease the rate of surface-water run-off from the land. The Proposed Scheme therefore includes a range of measures to manage surface water on agricultural land affected by construction and operation of the Proposed Scheme and associated mitigation works. In addition to new or altered ditches, Sustainable Drainage Systems (SuDS)' (i.e. informal balancing ponds, as described in the Phase 2b Western Leg Factsheet: Balancing Ponds and Replacement Flood Storage Areas), are included to control the flow of surface water between source and point of discharge, and thus help mitigate the impact of flood risk in the surrounding area.

2.1.5 An extensive programme of ground investigation and testing would be undertaken before the detailed design of the Proposed Scheme is completed. The results from the ground investigations would be used to validate the water infiltration assumptions used in the preliminary design.

3 Preliminary design approach

3.1.1 The approach taken in the preliminary design will be based on the principle that the rate of surface water run-off from the deposited material (e.g. embankments or environmental mitigation earthworks) or borrow pits should be as close as reasonably possible to that from the existing ground over which the material has been placed. The rate of surface-water run-off from an area of ground is relative to the water infiltration rate of that ground. In simple terms, the lower the water infiltration rate of the ground, the greater the rate of surface-water run-off during rainfall and snow-melt events. The surface water run-off rate from the existing ground is referred to as the 'greenfield run-off rate'.

3.1.2 Where necessary, land drainage areas and ditches are likely to be designed to intercept surface water run-off and control the discharge rate to any receiving watercourse. The controlled discharge rate is usually equivalent to the greenfield run-off rate from the existing land, with the aim of not increasing flood risk.

3.1.3 In locations where the deposited material may have a lower water infiltration rate than the existing ground, a precautionary approach would be taken to managing post-construction surface water run-off. This approach ensures that the storage volumes for land drainage areas and ditches are sufficient to accommodate surface water run-off and enable it to be discharged at the greenfield run-off rate.

3.1.4 In certain areas, where the shape of the earthworks and the track drainage system effectively remove the operational railway land from the land drainage catchment, specific measures to control surface water run-off are not required. This is because existing overland flows across adjacent land during periods of wet weather would already be reduced by the construction of the Proposed Scheme.

4 Potential refinements during detailed design and construction

4.1.1 As the ground investigation results become available, it is possible that the water infiltration rate of the deposited material may actually be greater than the relatively conservative assumptions that will be used in the preliminary design or that it could be increased as part of the construction process in some locations. The effect of increasing the deposited material's water infiltration rate - so that it is close to, or the same as, that of the existing ground - would be to reduce storage volumes or remove land drainage areas and associated drainage ditches completely.

4.1.2 Methods to increase the water infiltration rate could include scarifying (breaking up) the deposited material before topsoil is placed or mixing the excavated material with another material with greater water infiltration rate.

4.1.3 Where the geology is suitable and the limits of land to be acquired for the Proposed Scheme permit, it may be possible during detailed design to look at substituting certain planned ditches with shallow depressions or ‘swales’. This would allow water to infiltrate into the ground whilst enabling agricultural activities to continue in all but the severest weather. Elsewhere, it may be possible for planned ditches to be substituted with a network of conventional sub-surface drains.

4.1.4 Where this is not reasonably practicable, it is likely that ditches would be provided with crossing points by culverts at appropriate locations.

4.1.5 If alternative land drainage arrangements are feasible, these would be discussed with the landowner if they express an interest in reassessing the arrangements provided for in the Bill and shown in ES drawings.

4.1.6 It is expected that this would be done by the nominated undertaker in accordance with the following terms:

- The nominated undertaker would identify with the landowner existing drainage arrangements on their land holding. This would include the

carrying out, where reasonable, of inspections of the site and of any existing plans.

- The location of drains cut or disturbed by the construction works would be recorded by the nominated undertaker.
- The nominated undertaker would utilise appropriate drainage consultants to advise on drainage works and would engage with the landowner in respect of the pre and post drainage schemes that are required. The nominated undertaker would use reasonable endeavours to engage drainage consultants with working knowledge of the local conditions.
- Prior to the commencement of significant works to construct the Proposed Scheme, land drains affected by the works would, where practicable, be intercepted in a manner which maintains their efficiency. Work would be carried out to an appropriate specification after discussion with the landowner, which may include the design (e.g. layout, falls, pipe sizes and types, outfall arrangements) and timing of any land drainage works required.
- As-built plans of modifications to existing land drainage and of any new drainage works would be provided to the landowner as appropriate by the nominated undertaker.
- Where natural drainage patterns are adversely affected by the works to construct the Proposed Scheme, the provision of supplementary drainage or irrigation works would be considered having regard to an assessment of compensation and the commercial justification by the landowner.

5 Operation and maintenance

5.1.1 After construction of the Proposed Scheme is complete, much of the land acquired to construct the landscape earthworks is likely to be offered back to landowners for return to agricultural use as part of land compensation discussions. Except where the nominated undertaker needs to retain full control of the land drainage arrangements (e.g. to protect the new railway from flooding), these would be transferred to the landowner as part of the package of land to be offered back.

5.1.2 Once returned, such land drainage arrangements would become the sole responsibility of the landowner. Maintenance requirements would generally be consistent with normal farming practice, with any operations capable of being carried out by hand or using standard agricultural machinery. However, where appropriate, indicative maintenance plans would be provided by the nominated undertaker to landowners for guidance purposes.

5.1.3 Should a landowner decide at some stage in the future to alter the land drainage arrangements constructed by the nominated undertaker, they would

be responsible for any loss of agricultural productivity, any increased risk of flooding to their own land or premises, and any impacts to neighbours or other third parties.

6 More information

6.1.1 Further factsheets and details on the Proposed Scheme can be found at: www.hs2.org.uk/phase2b