

HS2

Phase 2a - Water resources and flood risk

May 2018

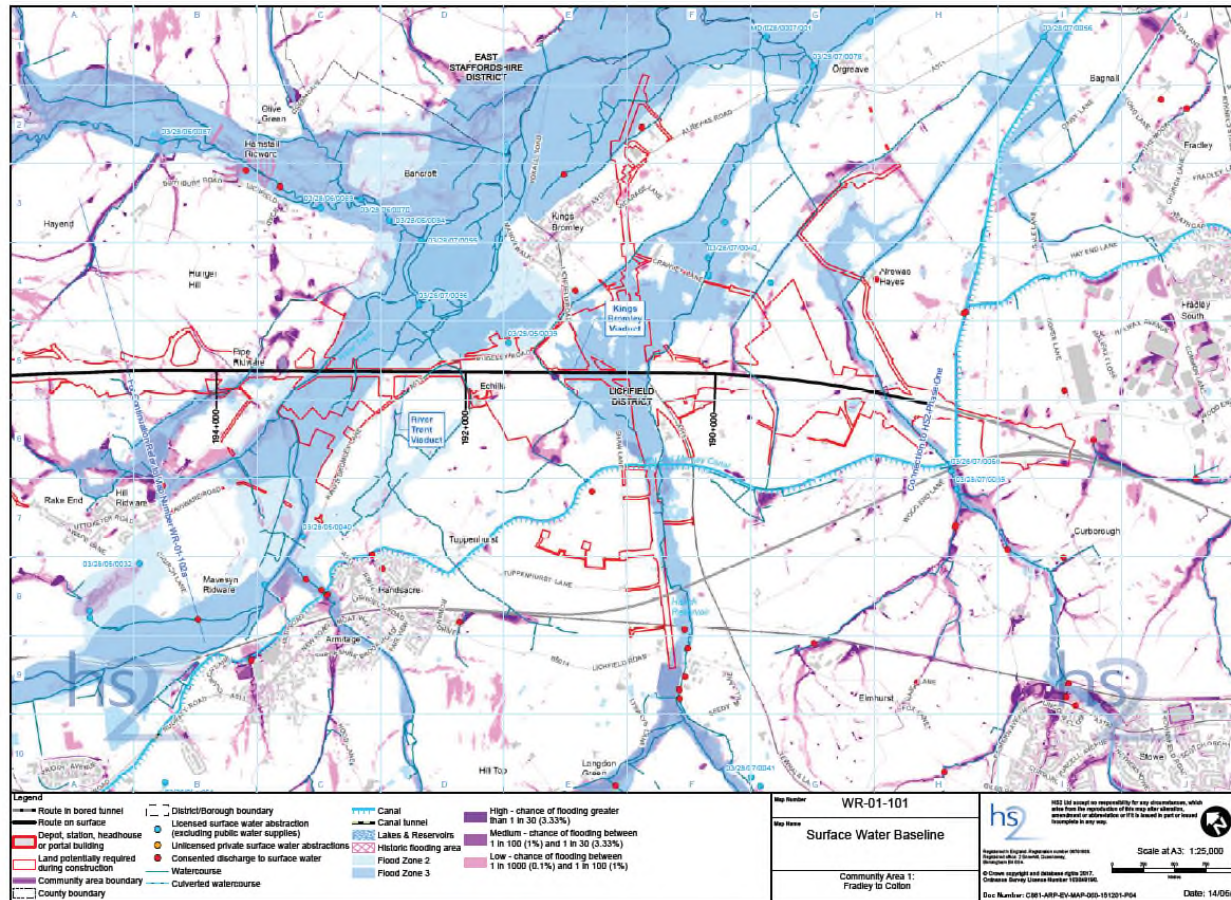
Water resources and flood risk assessment

- The Environmental Statement generally identified surface water features within 1km of the route of the Proposed Scheme. In urban areas the extent was 500m.
- All sources of groundwater were considered within 1km horizontally of the route of the Proposed Scheme.

Surface water

- The Proposed Scheme has been designed to avoid or reduce adverse impacts on rivers, streams, ponds and canals.
- The route crosses rivers and streams either by viaduct, clear span bridges or, where necessary, culverts.
- Structures have been designed to be sympathetic to their surroundings, to take account of ecological requirements and to help ensure the quality of watercourses is not adversely affected.

Surface water baseline

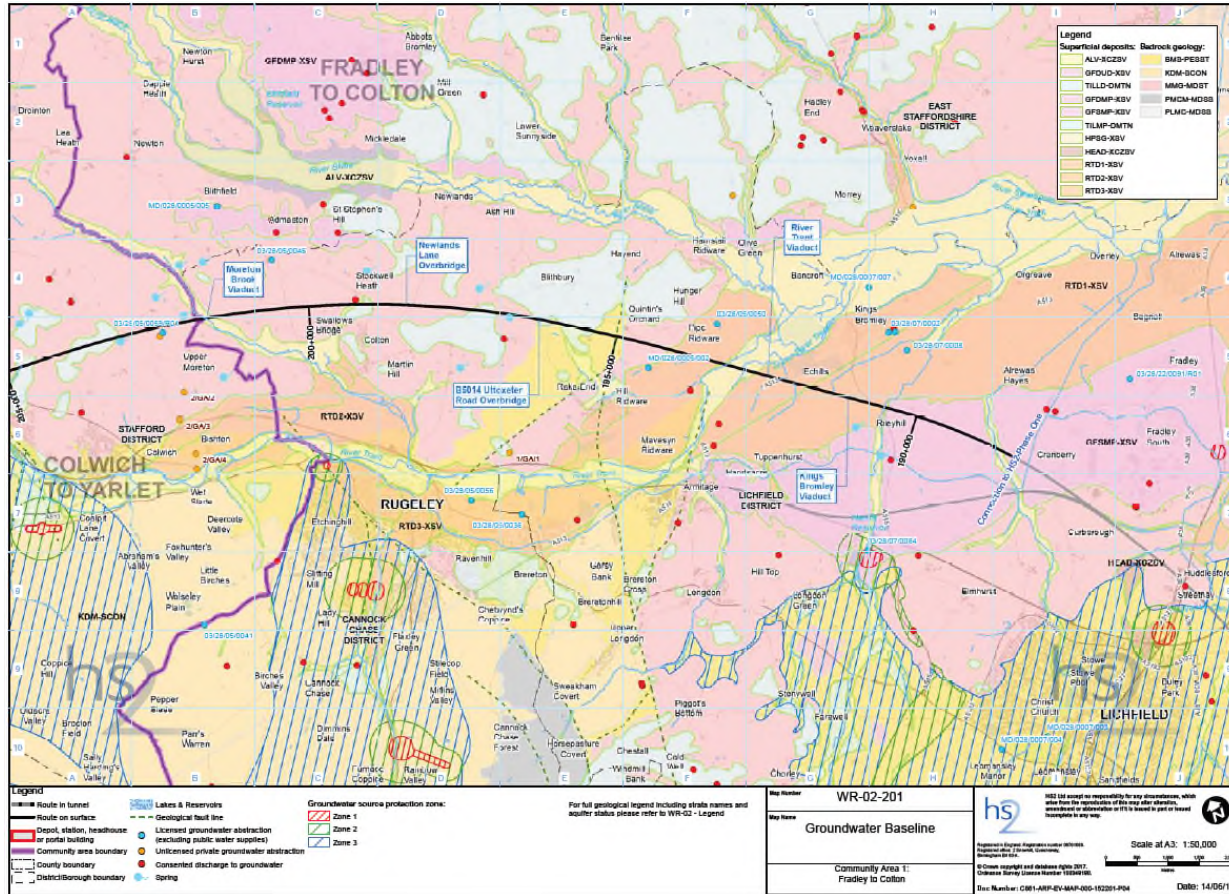


- Surface Water Baseline Plans show the Proposed Scheme’s alignment in relation to existing surface water features and areas at varying risks of flooding.

Groundwater

- The Proposed Scheme has been designed to avoid or reduce adverse impacts on sources of groundwater including local springs and water features.
- The impact of construction and operation of the Proposed Scheme on these features has been assessed in the Environmental Statement.
- The water table elevation and rock permeability is not yet fully known along much of route. Where that is the case, conservative assumptions have been made in the Environmental Statement to assess a reasonable worst case scenario.
- There are established methods for mitigating the effects of construction on groundwater.

Groundwater baseline



Groundwater Baseline Plans show the Proposed Scheme's alignment in relation to geological bedrock and sources of groundwater and areas of protection.

Protective provisions

- Under protective provisions in Schedule 32 Parts 4 and 5 of the Phase 2a Bill, the approval of the appropriate body is required prior to carrying out any works likely to affect groundwater or surface water (including canal) flows, level or quality.

Type of water resource	Appropriate body
Main River	Environment Agency
Ordinary Watercourse	Lead Local Flood Authority
Canal or navigable waterway	Canal & River Trust
Groundwater	Environment Agency

- No works can commence until the appropriate body is satisfied the impacts from construction have been properly addressed and any required mitigation is adequate.

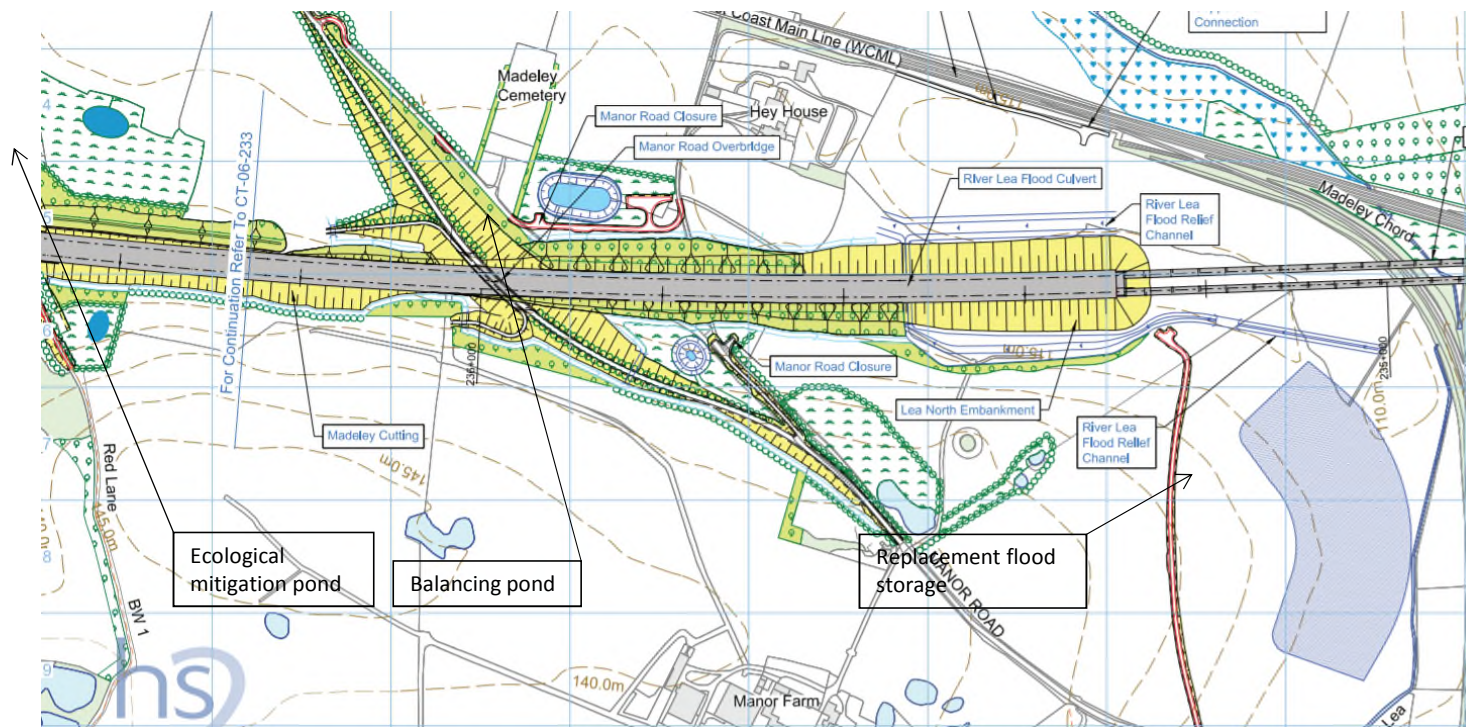
Flood risk assessment

- Flood risk is assessed in the Environmental Statement by a route-wide Flood Risk Assessment as well as in individual Community Area assessments.
- Where the Proposed Scheme has the potential to increase flood risk, the design avoids or mitigates that risk consistent with the approach in the National Planning Policy Framework and the supporting Technical Guidance.

Replacement flood storage areas and balancing ponds

- Replacement flood storage areas are provided to mitigate the impact of the Proposed Scheme on floodplains and to ensure that the Proposed Scheme does not cause an increased risk of flooding to vulnerable receptors (e.g. residential property) as a result of its construction or operation for the 1 in 100 year rainfall event with an allowance for climate change.
- Balancing ponds are required to regulate water flows from the Proposed Scheme to avoid an increase in flooding.

Replacement flood storage areas and balancing ponds



The image above shows how ecological mitigation ponds, balancing ponds and replacement flood storage areas are illustrated on the CT-06 maps.

Replacement flood storage areas

- Replacement flood storage areas will usually be shallow scrapes in the landscape and will generally be suitable for grazing once the scheme is operational. Arable farming will be possible in some locations.
- There is no requirement to fence these areas.

Balancing ponds

- Balancing ponds will typically be unlined and have banks with a varying profile. Those required for land drainage purposes will often resemble depressions in the ground rather than actual ponds.
- The majority will not be designed to hold water permanently, but will be dry most of the time, except following intense rainfall events.
- Although infiltration to ground is the preferred option for sustainable drainage systems, in certain locations ponds may be designed to be permanently wet where there are site specific environmental requirements to retain water.
- In many cases, it is not possible to combine balancing ponds for different types of drainage systems (e.g. railway, highway and land), as they need to be kept separate due to varying ownership, management and maintenance requirements.
- Systems have been designed to drain by gravity where possible; pumping will only be adopted where it is unavoidable.

Land drainage

- Existing land drainage systems will be addressed by the measures set out in the draft Code of Construction Practice.
- The draft Code of Construction Practice requires surveys to record for reinstatement purposes the presence of drainage, irrigation and water supplies.
- Land drainage issues affecting agricultural land will be addressed through the Farmers and Growers Guide.

Prevention of water pollution

- Section 16 of the draft Code of Construction Practice contains measures to prevent contamination and protect water resources during construction, including (but not limited to):
 - Use of oil interceptors and shut-off valves in drainage systems;
 - Secondary containment measures, such as plant nappies to retain leakage of fuel;
 - Preparation of pollution incident control plans;
 - Use of non-erodible bunds or silt or sediment fences when adjacent to watercourses;
 - Restrictions or controls on excavation within watercourses to limit effects on water flow, water quality, sedimentation, fisheries or river ecology; and
 - Measures specified within best practice guidance.

Hydrological controls, monitoring and engagement

- The controls contained in the Environmental Minimum Requirements, along with powers contained in the Phase 2a Bill and the Undertakings given by the Secretary of State, will ensure that impacts which have been assessed in the Environmental Statement will generally not be exceeded.
- The draft Code of Construction Practice requires consultation with the Environment Agency regarding water quality, flow and levels monitoring to be undertaken for watercourses and groundwater affected by construction works or discharge or surface water run-off.
- Engagement has been, and will continue to be, undertaken with the Environment Agency, Lead Local Flood Authorities, the Canal & River Trust and water companies, to ensure that likely residual significant adverse effects are managed and mitigated appropriately.