

9 Cumulative Impacts and Mitigation Measures

The Crossrail Line 1 Project is assessed as having few cumulative impacts requiring mitigation measures.

The only cumulative groundwater level impact on the deep aquifer would be the large cone of depression in East London caused by simultaneous dewatering for an estimated three years during construction at the Isle of Dogs Station and at seven vent shafts in the Central and South East Route Sections between Lowell Street and Arsenal Way. This has been described in full under Route Window C11 (Isle of Dogs Station), with further details of the methodology in Appendix E. Up to an estimated total of 30 million cubic metres of groundwater would be abstracted from wells, usually constructed in the Chalk deep aquifer, with a combined peak flow rate of up to 50 000 cubic metres per day. This would create an extensive cone of depression of the water table with significant drawdown of water levels at 25 licensed abstractions.

This dewatering would also increase the rate of inflow of saline water from the River Thames, but no significant changes in groundwater quality are likely to occur since this is an area where infiltration from the Thames has been occurring for a century or more and the aquifer consequently has non-potable water quality. Once dewatering ceases, water level recovery would be quite rapid and the rate of additional inflow from the Thames would reduce. The application of the abstraction well mitigation measures, as set out in Appendix B, would ensure that the viability of each water supply would be maintained or compensation provided, possibly through provision of an alternative source, and no significant residual impacts would occur.

The majority of the dewatering effluent from the deep aquifer would be discharged to the River Thames or the Docks from a series of discharge points near the individual dewatering sites. The impact on the salinity and flow of the river has been assessed and more details are given in Appendix E. The salinity of the river varies and the annual chloride concentration can range from around 30 to 3 000 mg/l near the Isle of Dogs. Since the effluent is expected to contain chloride concentrations of between 600 and 2 000 mg/l and would be well mixed by the tide, the Thames salinity would continue to fall within its normal range and no significant impacts on river water quality would occur.

The aggregate effect of tunnelling on flows in and between the shallow and deep aquifers is assessed to be very small since the majority of the route is in relatively low permeability strata above the Thanet Sands.

Impacts on water levels and water quality in the shallow aquifer around stations and vent shafts are, by their nature, site specific.

The large number of construction sites operating site drainage or dewatering systems during construction could, in principle, have an aggregate temporary effect at Thames Water's main sewerage pumping stations and treatment works. However, the larger flows would be discharged directly to the River Thames system and so the net effect would be small in relation the sewer system. Thames Water are being consulted and appropriate connection or discharge permits would be obtained.

Drainage from station and track drainage in the permanent works would discharge to separate sub catchments of the River Thames. The aggregate impact on the River Thames would be negligible compared to existing flows. Attenuation measures or SUDS principles would be applied to achieve low rates of runoff from some individual sites.

The increased frequency of train operations across the network is assessed as having a negligible impact on contaminant loadings since control systems and junctions are designed to minimise accidents and the use of electric trains with modern WC systems would generally lead to much lower contaminant loadings on the trackbed than on existing railways.

There are very few river crossings to be remodelled and little construction on unprotected floodplains. There would therefore be no general effect on flooding.

A risk has been identified that the works east of the River Lea in the River Thames flood zone 3 are prone to inundation in the event of a failure of flood defences. The permanent risk is covered in each of the relevant route windows. Over the construction timescales, there is less risk of overtopping than in the longer term since the freeboard will diminish with time as a result of rising sea levels. During construction, the risks are assessed as having lower consequences, regionally, prior to the tunnels linking different areas within the flood zone. Risks would be higher for construction workers, eg within the Thames Tunnel, than the general public. Similar measures to those proposed in the permanent scenario will need to be integrated into construction safety planning and emergency procedures across the various sites in East London in order to prevent inundation during breach scenarios in and through the tunnel system during construction.

10 Principal Findings and Summary

The principal finding of the water specialist's assessment is that the Crossrail Line 1 proposals have very few impacts on the water environment. Careful construction planning and management will counteract the majority of the potentially polluting effects of construction activities. The design has minimised the interactions with the water environment to a large degree. Where impacts have been assessed as being likely, a process of consultation has been initiated to identify and agree appropriate proposals for mitigation.

Further work will be undertaken during the detailed design phase. New site investigation data and monitoring of the water regime will be undertaken and it is anticipated that the knowledge of the existing drainage systems will be updated significantly as intrusive works are undertaken.