

**Lower Thames Crossing
Taskforce Briefing Paper**
Use of cut and cover tunnels
16 December 2019

Thurrock Council asked for a paper to be prepared on use of cut and cover tunnel section through their area. This paper sets out the key factors in considering the use of all structural types in developing the scheme to meet the Department for Transport's (DfT) scheme requirements.

The design approach in developing our design is, as follows:

Identifying the need

- The first stage in designing the Project was to understand the issues on the strategic road network and local roads in the area, both now and in the future. By undertaking this appraisal, the overall strategy for the road capacity and connectivity that need to be provided by the Project could be set out.

Considering the existing conditions

- To develop a design, it is essential to consider the existing conditions in the area. This includes existing communities, environmental conditions and the existing infrastructure.

Applying design standards

- The approach to design has been guided by standards and best practice, which seek to ensure that the Project is safe to construct and operate, sustainable and creates a positive legacy for future generations.

Considering the future

- Taking a holistic approach to sustainable design the Project takes account of National Policy Statement requirements, the DfT requirements, Highways England's *Sustainable Development Strategy* and supporting strategies. The aim is to incorporate sustainable principles into the design development and ensure a sustainable solution. Through ongoing engagement, the project is being tailored to best serve the needs of local communities in the future, acknowledging the balance between national, regional and local needs.

Following this design approach, it is recognised that covered routes have their purpose, and sections of cut and cover have been included at the tunnel portals and within junctions, as necessary. Green bridges are being considered in appropriate locations along the scheme to provide widened bridges at sites where community and/or environmental connectivity is required in excess of standard provision in order to provide adequate levels of mitigation.

With respect to the environment and quality of life, measures have been taken to:

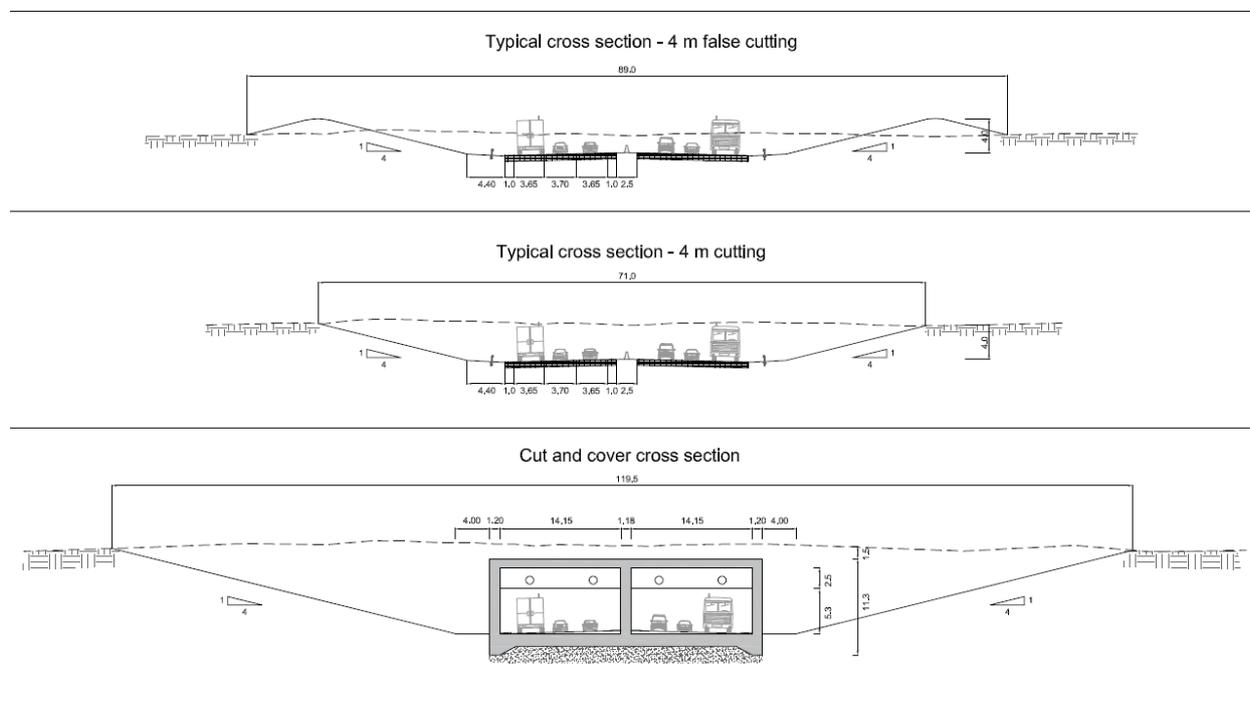
- minimise any adverse impacts on health, safety and the environment and help reduce the impact of transport-related emissions, thereby assisting the UK in meeting its climate change obligations;
- preserve or enhance quality of life locally, including the amenity of both urban and natural environments (including but not restricted to the assessment methodology criteria in the DfT's Transport Appraisal Guidance);
- conform, or be demonstrably likely to conform, to relevant UK legislation and EU Directives, e.g. with regard to air quality and impacts on protected species and habitats.

At the request of Thurrock's LTC Taskforce, Highways England has prepared this briefing to explore some of the factors that have influenced the extent to which 'Cut and Cover' is used along the proposed route of LTC.

Cut and cover tunnel construction is normally used at locations where there are planned developments or development is above/near the alignment. This might include significant changes in topography or proximity to buildings, utilities and other forms of infrastructure. From the sections shown in the figure below, it can be seen that there is significant additional land required to construct a cut and cover tunnel over an open cut solution.

In addition, there are several additional issues with using cut and cover tunnel lengths, including the ability to provide connectivity, limiting the provision of future junctions and sterilising the route for any further connectivity for the length of the tunnel plus approximately 350m each way along the route.

There are issues with constructing cut and cover tunnels in flood plains with impacts on groundwater and greater environmental disruption. Tunnels also have additional operational and maintenance requirements, making them less sustainable in the long term.



Typical Cross Sections of Cutting and Cut and Cover Tunnel

In addition, and in line with the National Networks National Policy Statement (the policy which governs the development of the scheme), the route has been designed as a balanced solution to reduce impacts wherever possible, including on people and the environment. The level of mitigation will be rigorously tested during the Development Consent Order (DCO) to assess adequacy and ensure a balanced solution is provided.

With this in mind, and where the route crosses existing roads or rail, the road alignment has been kept as low as possible. For example, the overall height of the route has been reduced significantly since the preferred route announcement in 2017.

It is absolutely correct for the Taskforce to challenge Highways England to provide a greater use of Cut and Cover Tunnels, as highways below ground could have a reduced impact on the

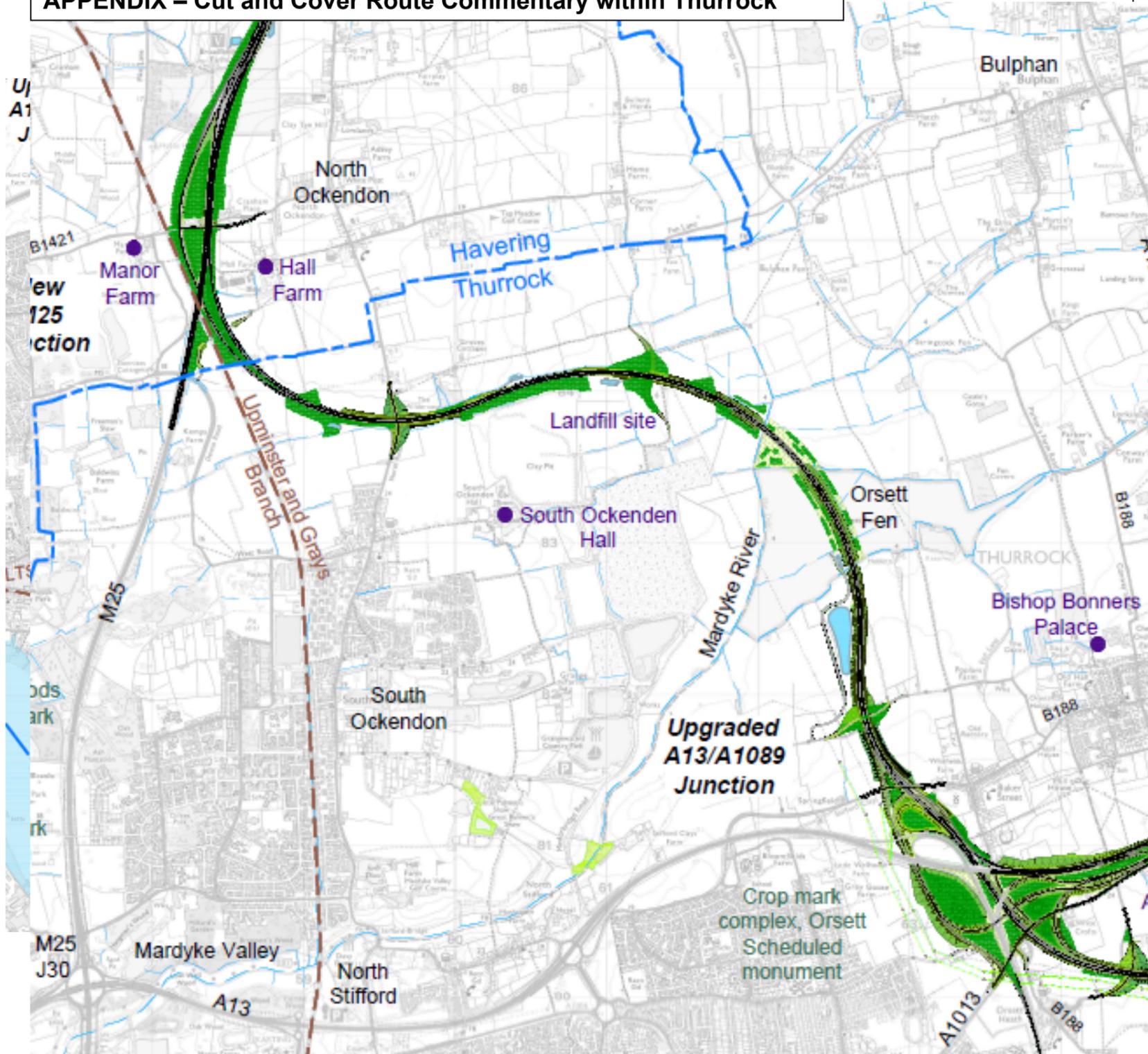


landscape and nearby properties. We do have to ensure that the project delivers value for money and is a viable and worthwhile investment for government. A cut and cover tunnelled road versus an open road are in the range of 8 to 15 times more expensive to build, will take considerably longer to construct, has higher running costs, as well as an increased carbon footprint. We therefore have to think very carefully around the provision of tunnelled sections along the alignment.

Ultimately, if the scheme does not meet the requirements of the National Networks National Policy Statement in terms of acceptable impacts, or if it no longer provide value for money, it will be not be progressed to the next stage of development. Meanwhile traffic continues to increase across the road network. This coupled with the need for an accelerated house building programme in the region, will only lead to further stress on the existing road network which impacts resident's mobility and quality of life, the environment and the local economy

It is incumbent on Highways England to rigorously test options through the Development Consent Order process and to listen to and respond to the views of residents and stakeholders. We look forward to discussing this further at the December Taskforce.

APPENDIX – Cut and Cover Route Commentary within Thurrock



North Portal to Muckingford Road

Options have been considered for the North Portal to Muckingford Road. The current layout of the infrastructure is shown following the route. An extension to have a vertical curve at the tunnel. This adding construction point may be considered. The extension to the Rest and to LTC, south of the Ground conditions for tunnelling. This running at shallow angles to the ground treatment impacting on the environment. The area between the environment manage our own. Extending the protection in Muckingford. A longer tunnel construction. Longer tunnels potentially reduce the impact.

Ockendon Link - A13 Junction to M25 Junction

- Ground conditions are very soft and waterlogged in the area so the tunnel box would need to be piled, adding significant expense and construction duration. It would also add further risk of flooding, which may involve extended flood defence works.
- There are significant utilities in the area, including high pressure gas mains which would require further and more extensive diversions to enable the tunnel to be constructed.
- Due to the curvature of the route, the cut and cover tunnel would need to have a wider verge on the inside of the curve to provide adequate forward visibility. Wider construction would result in higher costs and programme extension
- A straightened tunnel route would incur considerable cost as it would need to pass through live Ockendon landfill site.
- Operational requirements would include service buildings at each portal.

Overall

A further tunnel would impact a greater area of land during construction, due to the extent of plant and equipment needed for construction and would utilise much more concrete than open road/viaduct structures, impacting the carbon generated during construction.

The tunnel would preclude any future connectivity to the LTC mainline.

At all locations, Highways England are working hard to mitigate the impact of the route. This is in terms of noise, air quality and landscape impact. This mitigation may take the form of route lowering, introduction of false cuttings and additional tree planting and landscaping.

All our proposals will be rigorously challenged throughout the DCO process. This has already begun and we are carefully examining all the responses we received at Statutory Consultation and using these to shape the final scheme for planning.

Chadwell S

The length of the road would be reduced. Safe merging and management of the road. Due to the curve on the construction site. A straightened line. Due to the proposed route would be required. The tunnel would be Operational requirements. Emergency services distance further.