

# **A12 Chelmsford to A120 widening scheme**

## **SUPPLEMENTARY CONSULTATION: ENVIRONMENTAL REPORT**

November 2021

## CONTENTS

<b>1</b>	<b>Introduction .....</b>	<b>3</b>
<b>2</b>	<b>Environmental assessment.....</b>	<b>5</b>
2.1	Closure of Easthorpe Road .....	5
2.2	Inworth Road widening .....	6
2.3	Cadent gas main diversion.....	10
2.4	Watercourse 21.....	11
2.5	Junction 21 northern link road.....	12
2.6	Removing noise barrier through Hatfield Peverel.....	14
2.7	Temporary removal of the noise barrier at Market Lane .....	17
<b>3</b>	<b>Summary.....</b>	<b>20</b>

## APPENDICES

	<b>Appendix A Cadent gas main diversion .....</b>	<b>22</b>
A.1	Introduction .....	22
A.2	Scheme description.....	23
A.3	Assessment methodology .....	26
A.4	Assessment of effects .....	30
A.5	Conclusions.....	51
	<b>Acronyms .....</b>	<b>56</b>
	<b>Glossary .....</b>	<b>57</b>
	<b>Figure 1 Existing and proposed gas mains diversion .....</b>	<b>63</b>
	<b>Figure 2 Environmental constraints.....</b>	<b>64</b>

## LIST OF PLATES

	Plate 2.1 Noise level reductions with a southern noise barrier.....	16
	Plate 2.2 Noise level reductions with no noise barriers and a surface with increased noise reducing properties .....	17
	Plate A.1 Approximate routes of the diversion corridors .....	24
	Plate A.2 Typical section indicating working width for 600mm HPP diversion .....	26

## LIST OF TABLES

	Table 2.1 Environmental effects from closing Easthorpe Road .....	5
	Table 2.2 Environmental effects from pinch point widening along Inworth Road .....	7

---

Table 2.3 Environmental effects from the Watercourse 21 design change .....	12
Table 2.4 Environmental effects from using a junction 21 northern connector.....	13
Table 2.5 Environmental effects from removing noise barriers at Hatfield Peverel and using a surface with increased noise reducing properties .....	15
Table 2.6 Environmental effects from temporary removal of the noise barrier at Market Lane.....	18
Table A.1 Preliminary assessment of effects for diversion corridor 1.....	31
Table A.2 Preliminary assessment of effects for diversion corridor 2.....	38
Table A.3 Preliminary assessment of effects for diversion corridor 3.....	43
Table A.4 Preliminary assessment of effects for diversion corridor 4.....	46
Table A.5 Preliminary assessment of effects for diversion corridor 5.....	49
Table A.6 Summary of potential significant effects from the HPP diversion.....	54

# 1 Introduction

- 1.1.1 The A12 Chelmsford to A120 widening scheme (the 'proposed scheme') comprises improvements to the A12 between junction 19 (Boreham interchange) and junction 25 (Marks Tey interchange), a distance of approximately 24km, or 15 miles. The proposed scheme involves widening the A12 to three lanes throughout (where it is not already three lanes) with a bypass between junctions 22 and 23 and a second bypass between junctions 24 and 25. It also includes safety improvements, including closing off existing private and local direct accesses onto the main carriageway, and providing alternative provision for walkers, cyclists and horse riders (WCH) to existing routes along the A12, which would be removed.
- 1.1.2 A Preliminary Environmental Information Report (PEIR) was produced to support a statutory public consultation for the proposed scheme. The statutory consultation period ran from 22 June to 16 August 2021. The PEIR and its associated figures can be found online on the proposed scheme statutory consultation website:  
<https://highwaysengland.citizenspace.com/he/a12chelmsford-to-a120-widening-consultation-june21/>
- 1.1.3 Since the statutory consultation, further work has been undertaken on the design that was presented at that consultation, taking into account the feedback that was received. The main areas where the design has changed, or has been updated, since the statutory consultation was held which could affect the environment, are:
- Closing Easthorpe Road to traffic accessing the A12
  - Widening Inworth Road where there are existing pinch points
  - Diverting a gas main operated by Cadent Gas Limited (Cadent)
  - Flood risk mitigation for a watercourse known as 'Watercourse 21' \*
  - Using Wellington Bridge as a northern link road to junction 21
  - Removing a proposed noise barrier through Hatfield Peverel and using road surfacing with increased noise reducing properties
  - Temporary removal of an existing noise barrier at Market Lane
- 1.1.4 The location of these design changes are shown visually in the Brochure and Map Books for the supplementary consultation, which can found online at [www.nationalhighways.co.uk/A12](http://www.nationalhighways.co.uk/A12).
- 1.1.5 This Environmental Report documents the potential environmental effects from these design changes, as well as any mitigation that would be required to mitigate any significant adverse effects. Descriptions of the proposed design changes, along with the potential effects and mitigation, are provided in Section 2 of this report.

- 
- 1.1.6 Due to the size and nature of the Cadent gas main diversion works, a separate appendix has been produced to document the potential environmental effects of the diversion options being considered (Appendix A of this report).
- 1.1.7 There have been additional design changes since the statutory consultation. These are described as Category 2 changes, which are included in the Brochure, together with Category 3 changes which are described in the Map Books for the supplementary consultation. These other design changes are relatively minor, and result in no material change to the environmental assessment conclusions reported in the PEIR. These design changes are therefore not covered within this Environmental Report. The exception to this is the Watercourse 21 item marked with an (\*) in the bullet point list above; although this is a minor design change, it is included in this Environmental Report as the design change is specifically related to flood risk mitigation.

## 2 Environmental assessment

### 2.1 Closure of Easthorpe Road

- 2.1.1 The assessment presented in the PEIR was based on Easthorpe Road being open to traffic from the existing A12 via the Easthorpe Road overbridge, allowing traffic from all directions to come to and from Easthorpe Road. Following feedback received from the statutory consultation, it is proposed to close Easthorpe Road to traffic to and from the existing A12, making the road a cul-de-sac, while maintaining access (via an accommodation bridge) for landowners, walkers, cyclists and horse-riders.
- 2.1.2 This change in design would potentially affect the assessment conclusions for the following environmental aspects:
- Air quality – closing Easthorpe Road would change traffic flows on the local road network, particularly London Road and School Road in Copford, which could impact air quality
  - Noise and vibration – closing Easthorpe Road would change traffic flows on the local road network, particularly London Road and School Road in Copford, which could impact noise levels
- 2.1.3 Table 2.1 summarises the changes in environmental effects and mitigation for the above aspects as a result of this design change.
- 2.1.4 There would be no material change in the assessment conclusions for the remaining environmental aspects assessed in the PEIR.

**Table 2.1 Environmental effects from closing Easthorpe Road**

Aspect	Change in effects	Change in mitigation
Air quality	<p>The PEIR air quality assessment concluded that there would be slight changes in air quality along Easthorpe Road, and no breaches of air quality objectives.</p> <p>With Easthorpe Road closed, there would be a beneficial impact along Easthorpe Road, and negligible changes in air quality along London Road and School Road. There is therefore no material change to the air quality conclusions presented in Chapter 6 of the PEIR due to this design change.</p>	No additional mitigation required.
Noise and vibration	<p>With Easthorpe Road open, as assessed in Chapter 12 of the PEIR, there would be no significant noise effects throughout Easthorpe and no change along School Road or London Road.</p> <p>With Easthorpe Road closed, there would be a reduction in noise of more than 3 dB(A) at receptors along Easthorpe Road. This would be a significant beneficial effect. For receptors along School Road and London Road, there would be a negligible (&lt;1 dB(A)) increase in noise with Easthorpe Road closed.</p>	No additional mitigation required.

## 2.2 Inworth Road widening

2.2.1 The Provisional Order Limits presented at the statutory consultation allowed for improvements along Inworth Road. However, the PEIR did not include an assessment of these improvements, as at that time design development was ongoing. Since the statutory consultation, design work has advanced and it is now proposed to undertake localised widening at pinch points along Inworth Road. This includes widening straight sections of the road to provide a minimum 6.1m carriageway width; and widening bends to accommodate two large vehicles passing in opposite directions. Suitable drainage and flood risk mitigation would also be included.

2.2.2 This change in design would potentially affect the assessment conclusions for the following environmental aspects:

- Air quality – pinch point widening would not change traffic flows along Inworth Road, however, there has been a correction to the traffic model since the PEIR which could impact air quality along Inworth Road
- Cultural heritage – temporary noise and visual impacts from construction plant and activities could impact the setting of listed buildings along Inworth Road
- Landscape – localised widening would result in the loss of trees and hedgerows in some locations
- Biodiversity – localised widening would result in the loss of habitat in some locations
- Noise and vibration – pinch point widening would not change traffic flows along Inworth Road, however, there has been a correction to the traffic model since the PEIR that could impact noise levels; there would also be temporary noise impacts from construction plant and activities
- Population and health – the majority of the pinch point widening would be possible within the existing highway boundary but there could be additional land take to provide drainage and flood risk mitigation
- Road drainage and the water environment – Inworth Road currently has a high risk of flooding; mitigation may need to be provided to ensure the widened road is safe for use for its lifetime and does not increase flood risk elsewhere

2.2.3 Table 2.2 summarises the change in environmental effects and mitigation for the above aspects as a result of this design change.

2.2.4 There would be no material change in the assessment conclusions for the remaining environmental aspects assessed in the PEIR.

**Table 2.2 Environmental effects from pinch point widening along Inworth Road**

Aspect	Change in effects	Change in mitigation
Air quality	<p>The PEIR air quality assessment concluded that there would be minor increases in nitrogen dioxide concentrations along Inworth Road, and no breaches of air quality objectives.</p> <p>The proposed pinch point widening is unlikely to affect traffic flows to the extent that air quality would materially change compared to the air quality assessment conclusions in Chapter 6 of the PEIR. There would therefore be no significant air quality effects from this design change.</p>	No additional mitigation required.
Cultural heritage	<p>The pinch point widening, drainage ponds and flood risk mitigation would result in temporary short-term impacts on the setting of a number of listed buildings.</p> <p>There is potential for temporary adverse effects on the Parish Church of All Saints (grade I listed building) from the loss of mature trees at the boundary of the church land, and from construction noise, that would impact its setting, particularly during construction and in year 1 of operation. It may be avoidable once further tree survey data is available and as the design develops, however at this stage a worst-case assumption is that there would be limited encroachment in to the church land to facilitate construction works, resulting in a short-term significant adverse effect. This could be mitigated in the long-term through replacement planting.</p> <p>There would also be potential for temporary adverse effects the setting of a further 11 grade II listed buildings from the visual and noise effects of construction work.</p> <p>The drainage ponds and flood risk mitigation have the potential to remove as yet unidentified below ground archaeological remains.</p> <p>These are new impacts which were not reported in Chapter 7 of the PEIR, as the nature of the design works along Inworth Road were not known at the time of the PEIR assessment.</p>	<p>Tree and hedgerow replanting would mitigate impacts to the setting of listed buildings in the long term.</p> <p>Potential tree loss at the Parish Church of All Saints would be mitigated with a replacement boundary, including hedgerow and tree planting.</p> <p>Short term impacts from noise disturbance during construction would be mitigated by implementing good site practice, as described in the noise chapter of the PEIR.</p> <p>A programme of archaeological work to understand and record any below ground remains prior to construction would reduce impacts on such remains.</p>
Landscape	No tree or hedgerow loss along Inworth Road was assessed in Chapter 8 of the PEIR, as design work was ongoing at the time of the PEIR assessment.	Most sections of lost hedgerow would be mitigated by replanting.



Aspect	Change in effects	Change in mitigation
	<p>The pinch point widening proposals would result in the loss of roadside hedgerows and trees opening up views of Inworth Road and passing traffic from some visual receptors such as residents, including those in listed buildings. There would be further loss of vegetation for drainage and flood compensation, which would open views of construction activities for the excavation of drainage ponds, resulting in some short-term significant adverse effects. The hedgerows are largely mature to over-mature and are generally unremarkable as individual specimens but contribute to the rural character of the road and setting of the village. There are more substantial belts of trees away from the road. Lost vegetation would be replanted where space allows.</p> <p>As discussed in the cultural heritage section, there is the potential for temporary adverse effects on the Parish Church of All Saints (grade I listed building) from the loss of mature trees at the boundary of the church land. This could be mitigated in the long-term through replacement planting.</p>	<p>Potential tree loss at the Parish Church of All Saints would be mitigated with a replacement boundary, including hedgerow and tree planting.</p> <p>Mitigation planting would help to integrate drainage ponds into the landscape.</p> <p>Additional tree surveys will be undertaken along Inworth Road. These surveys will be used to avoid tree loss where practicable.</p>
<p>Biodiversity</p>	<p>The pinch point widening would have a potential adverse effect on the following species as a direct result of habitat loss:</p> <ul style="list-style-type: none"> <li>• Bats due to the loss of mature trees (for roosting) and hedgerows (for commuting and foraging)</li> <li>• Breeding birds as loss of vegetation would result in a loss of habitat</li> <li>• Badgers due to the potential to impact setts</li> </ul> <p>There is also potential for temporary disturbance (noise and vibration) to impact these species during the construction phase.</p> <p>Ecology surveys will be undertaken along Inworth Road to confirm the presence or likely absence of protected species.</p> <p>Overall, with the implementation of mitigation, any impacts are likely to be minor and not significant.</p> <p>These are new impacts which were not reported in Chapter 9 of the PEIR, as the nature of the design works along Inworth Road were not known at the time of the PEIR assessment.</p>	<p>Mitigation for impacts to species along Inworth Road would follow the broad principles set out in the PEIR:</p> <ul style="list-style-type: none"> <li>• Provision of bat boxes to compensate for the loss of mature trees</li> <li>• Replanting of hedgerows to maintain linear features within the landscape to support commuting and foraging bats</li> <li>• Closure of setts under licence and provision of artificial setts should any main setts be impacted</li> <li>• Timing of works to avoid sensitive periods for protected species</li> <li>• Opportunities will be explored to deliver a biodiversity net gain</li> </ul>

Aspect	Change in effects	Change in mitigation
Noise and vibration	<p>Chapter 12 of the PEIR reported that changes in traffic flows along Inworth Road as a result of the new junction 24 would increase noise levels by approximately 1 to 2 dB(A). Noise increases of this magnitude are not typically considered significant, however, due to the high existing noise levels that some dwellings experience, this increase could have resulted in significant effects to some receptors.</p> <p>Since holding the statutory consultation, the traffic model has been updated to more accurately reflect the condition of Inworth Road. The updated modelling shows that while traffic would still increase through Inworth, it would not increase by as much as what was presented at statutory consultation. This results in noise level increases between 1 to 1.5 dB(A), removing the significant effects reported in the PEIR.</p> <p>Impacts during construction are likely to be minor and not significant.</p>	<p>No additional mitigation required.</p> <p>Impacts during construction would be mitigated through good site practice, as set out in Chapter 12 of the PEIR.</p>
Population and health	<p>The proposals would result in the loss of roadside hedgerows and trees which may impact on the boundaries of a small number of residential properties near the pinch points. This would have negligible to minor magnitudes of impacts on residential land use, but may have a negative impact on mental wellbeing for those individuals. Impacts on individual mental wellbeing are difficult to mitigate. Engagement with affected residents would therefore be maintained throughout the construction phase.</p> <p>The proposals for drainage ponds and flood risk mitigation would result in some permanent land-take from arable fields. There is potential that these proposals would leave un-tenable areas in some of the smaller fields. This would result in a moderate adverse impact on land use. A public footpath (145_15) runs close to one of the proposed drainage pond locations. Access to this footpath may be disrupted during earthworks for safety reasons, but once operational there should be no change in impacts for walkers who use the public footpath.</p>	<p>Reinstate public right of way on completion of works.</p>

Aspect	Change in effects	Change in mitigation
Road drainage and the water environment	<p>There are existing flood issues on Inworth Road. Flood risk along Inworth Road was not assessed in Chapter 14 of the PEIR as the design at that stage included no widening of Inworth Road.</p> <p>The pinch point widening would result in increased runoff of surface water from the road. The impact on existing flood risk will be assessed, but is anticipated to be small. Unmitigated, this may result in a small increase in the existing flood risk to local receptors including properties and Inworth Road itself.</p> <p>Detailed assessment of flood risk will be undertaken to determine the risk of flooding to the widened road, and whether widening would cause any increase in flood risk elsewhere. If found to be necessary, flood mitigation would be incorporated as required, and the proposed scheme would seek to reduce the existing flood risk.</p> <p>There would be no effect to the physical or chemical qualities of watercourses unless runoff of surface water enters the watercourse. Unmitigated, this could affect riverine water quality and increase the volume of fine sediments carried in suspension. With mitigation, effects are unlikely to be significant.</p>	<p>Additional drainage would be required, and this would likely include drainage attenuation ponds. If found to be necessary following detailed flood risk assessment, flood mitigation would be incorporated as required. This would likely be in the form of flood storage areas.</p> <p>Good practice methods would be put in place during construction to prevent surface water runoff entering watercourses, as set out in Chapter 14 of the PEIR.</p>

## 2.3 Cadent gas main diversion

2.3.1 A separate appendix has been prepared to document the potential environmental effects from the diversion corridors for the gas main (Appendix A of this report).

2.3.2 In summary, the gas main diversion corridors could result in the following significant effects:

- All diversion corridors have the potential to remove archaeological remains associated with crop marks east of Olivers Farm. These remains are currently assessed as having negligible value, but this could change following completion of ongoing trial trenching. There is therefore the potential for a significant effect on these remains subject to the findings of the trial trenching.
- Diversion corridors 2, 4 and 5 have the potential for significant effects on additional archaeological remains associated with cropmarks south of Little Braxted; and corridors 2 and 5 also have the potential for significant effects on the site of Machin's Mill or Blue Mills.
- All diversion corridors have the potential for significant effects on local landscape character and visual receptors due to vegetation loss.

- All diversion corridors have the potential for significant effects from the loss of mature woodland, which is difficult to mitigate due to the time required for replacement habitats to mature.
- Diversion corridors 1 and 3 would involve excavations adjacent to Whetmead Local Nature Reserve. These corridors could result in a significant effect to this site, as Whetmead is a potential groundwater dependent terrestrial ecosystem, and excavations could impact groundwater flows.
- All diversion corridors have the potential for significant effects on groundwater due to changes in groundwater flows.

2.3.3 The above effects would largely be limited to the construction phase, as once the gas main is installed there would be no above ground infrastructure. However, the landscape and visual effects might extend into the operational phase due to the need to maintain an easement (a legal right to enter land above the gas pipeline for maintenance works), which would prevent tree replanting along the easement.

## 2.4 Watercourse 21

2.4.1 The preliminary flood risk assessment at PEIR identified a potential flooding issue at an existing culverted crossing of the A12 for an ordinary watercourse located approximately 750m east of the River Blackwater crossing at junction 23. This watercourse has been denoted as 'Watercourse 21' within the list of unnamed watercourses across the proposed scheme area. The assessment for the PEIR included allocation of an area upstream of the A12 crossing for provision of a flood storage reservoir as a potential option to address the flood risk. Since the statutory consultation, design work has advanced and it is now proposed to provide a reduced flood storage area in conjunction with a diversion to take flood flows in this watercourse directly to the River Blackwater via a drainage ditch and buried pipe along the southern boundary of the A12.

2.4.2 This change in design would potentially affect the assessment conclusions for the following environmental aspects:

- Road drainage and the water environment – the diverted flows would increase the flood flows in the River Blackwater and this will need to be modelled for flood risk assessment purposes

2.4.3 Table 2.3 summarises the change in environmental effects and mitigation for the above aspects as a result of this design change.

2.4.4 There would be no material change in the assessment conclusions for the remaining environmental aspects assessed in the PEIR.

**Table 2.3 Environmental effects from the Watercourse 21 design change**

Aspect	Change in effects	Change in mitigation
Road drainage and the water environment	<p>Chapter 14 of the PEIR identified the need for further analysis at the Watercourse 21 crossing.</p> <p>The Watercourse 21 flood mitigation diversion now proposed (pipe and ditch combination) will be hydraulically modelled in order to confirm that this diversion would not increase flood risk associated with the River Blackwater (the receiving watercourse for the diverted Watercourse 21). The timings of the flood peaks for both watercourses will be assessed as part of the modelling exercise. It is anticipated that this exercise will reveal a negligible impact on flood risk.</p> <p>Diverted flows would have a negligible effect on the physical and chemical conditions within the River Blackwater. There may be an increase in fine sediment concentrations within the receiving watercourse but this would be minimal.</p>	<p>Hydraulic modelling is ongoing. No additional mitigation (beyond the storage area and watercourse diversion that make up this design change) is anticipated to be required.</p>

## 2.5 Junction 21 northern link road

2.5.1 The design presented at the statutory consultation had a link road to the south of the A12 connecting The Street to junction 21, with Wellington Bridge providing walker, cyclist and horse-rider access only. Due to the proposed closure of junctions 20a and 20b, more traffic would turn right if heading north from Maldon to travel to the new junction 21. Stakeholders raised concerns during the statutory consultation about the high noise levels properties along The Street (between Maldon Road and the new junction 21) would experience. Following this feedback, it is now proposed to remove the southern link road and use Wellington Bridge as a northern link road to the new junction 21.

2.5.2 This change in design would potentially affect the assessment conclusions for the following environmental aspects:

- Air quality – using Wellington Bridge as a northern link road to junction 21 would change traffic flows on the local road network, particularly The Street, which could impact air quality
- Noise and vibration – using Wellington Bridge as a northern link road to junction 21 would change traffic flows on the local road network, particularly The Street, which could impact noise levels
- Population and health – a change in noise levels could affect health and wellbeing in the area

2.5.3 Table 2.4 summarises the change in environmental effects and mitigation for the above aspects as a result of this design change.

2.5.4 There would be no material change in the assessment conclusions for the remaining environmental aspects assessed in the PEIR.

**Table 2.4 Environmental effects from using a junction 21 northern connector**

Aspect	Change in effects	Change in mitigation
Air quality	<p>With the southern link road to junction 21 in place, as assessed in Chapter 6 of the PEIR, traffic flows would be increased on The Street (east of Maldon Road) compared to the scenario without the proposed scheme in place. This would likely increase nitrogen dioxide concentrations for receptors between Maldon Road and junction 21, but would not result in any breach of air quality objectives. With the proposed northern link road to junction 21, traffic flows would be removed from The Street east of Maldon Road due to the removal of the southern link road to junction 21, which would reduce pollutant exposure at adjacent receptors</p> <p>With the southern link road to junction 21 in place, as assessed in Chapter 6 of the PEIR, dwellings within The Vineyards north of Wellington Bridge would experience a negligible improvement in air quality. With the proposed northern link road to junction 21, traffic flows would be increased on Wellington Bridge and the northern link compared to the scenario without the proposed scheme in place. This would result in a slight increase in nitrogen dioxide concentrations to dwellings in The Vineyards adjacent to the current northern slip road, but would not result in any breach of air quality objectives (which are the legally defined thresholds below which harmful effects from pollutant exposure are not expected); there would therefore be no significant effects.</p> <p>Traffic flows on The Street west of the Maldon Road would be reduced by a similar magnitude compared to the scenario without the proposed scheme regardless of whether the northern or southern link road are included.</p>	No additional mitigation required.
Noise and vibration	<p>With the southern link road to junction 21, as assessed in Chapter 12 of the PEIR, there would be a negligible increase in noise at the dwellings within The Vineyards. This increase would be caused by a slight increase in traffic flow and speed on the A12. With the proposed northern link road to junction 21, there would be an increase in noise of around 2 dB(A) at the dwellings within The Vineyards (this accounts for the proposed surface with increased noise reducing properties that would be included through Hatfield Peverel). This would be a minor impact and not significant.</p> <p>With the southern link road to junction 21, as assessed in Chapter 12 of the PEIR, there would be significant adverse effects for nine dwellings along The Street to the east of Maldon Road caused by an increase in noise of more than 3 dB(A). With the proposed northern link road to junction 21, there would be a significant decrease in noise of around 4 dB(A) for the majority of the dwellings along The Street to the east of Maldon Road, removing the significant effects reported in the PEIR.</p>	No additional mitigation required.

Aspect	Change in effects	Change in mitigation
Population and health	<p>With the northern link road to junction 21, dwellings in The Vineyards would have continued vehicular access to Hatfield Peverel, removing the negligible adverse magnitude impact on residential land use assessed in Chapter 13 of the PEIR.</p> <p>There would be a minor increase in noise and air pollution (not significant) at The Vineyards. However, on balance a greater number of people would benefit from reduced air and noise emissions than would be adversely impacted, compared to the option to include the southern link road to junction 21.</p>	No additional mitigation required.

## 2.6 Removing noise barrier through Hatfield Peverel

- 2.6.1 The design presented at the statutory consultation included a 3m high noise barrier between junctions 20a and 21, on the south side of the A12. Since the statutory consultation, further work has been undertaken to develop solutions to reduce noise levels through Hatfield Peverel. This has determined that use of a surface with increased noise reducing properties to those of a standard low noise road surface could deliver a decrease in noise to a greater number of properties through Hatfield Peverel. As such, it is now proposed to remove the noise barrier from the design and surface the A12 with a surface with increased noise reducing properties through Hatfield Peverel. This new surface would reduce noise by 3 dB(A) more than the existing low noise road surfacing through Hatfield Peverel.
- 2.6.2 This change in design would potentially affect the assessment conclusions for the following environmental aspects:
- Landscape – the extent of vegetation removal required to facilitate the road widening would open up views of the A12
  - Noise and vibration – use of a surface with increased noise reducing properties instead of noise barriers would reduce noise levels through Hatfield Peverel
  - Population and health – changes in noise levels could affect health and wellbeing for residents of Hatfield Peverel
- 2.6.3 Table 2.5 summarises the change in environmental effects and mitigation for the above aspects as a result of this design change.
- 2.6.4 There would be no material change in the assessment conclusions for the remaining environmental aspects assessed in the PEIR.

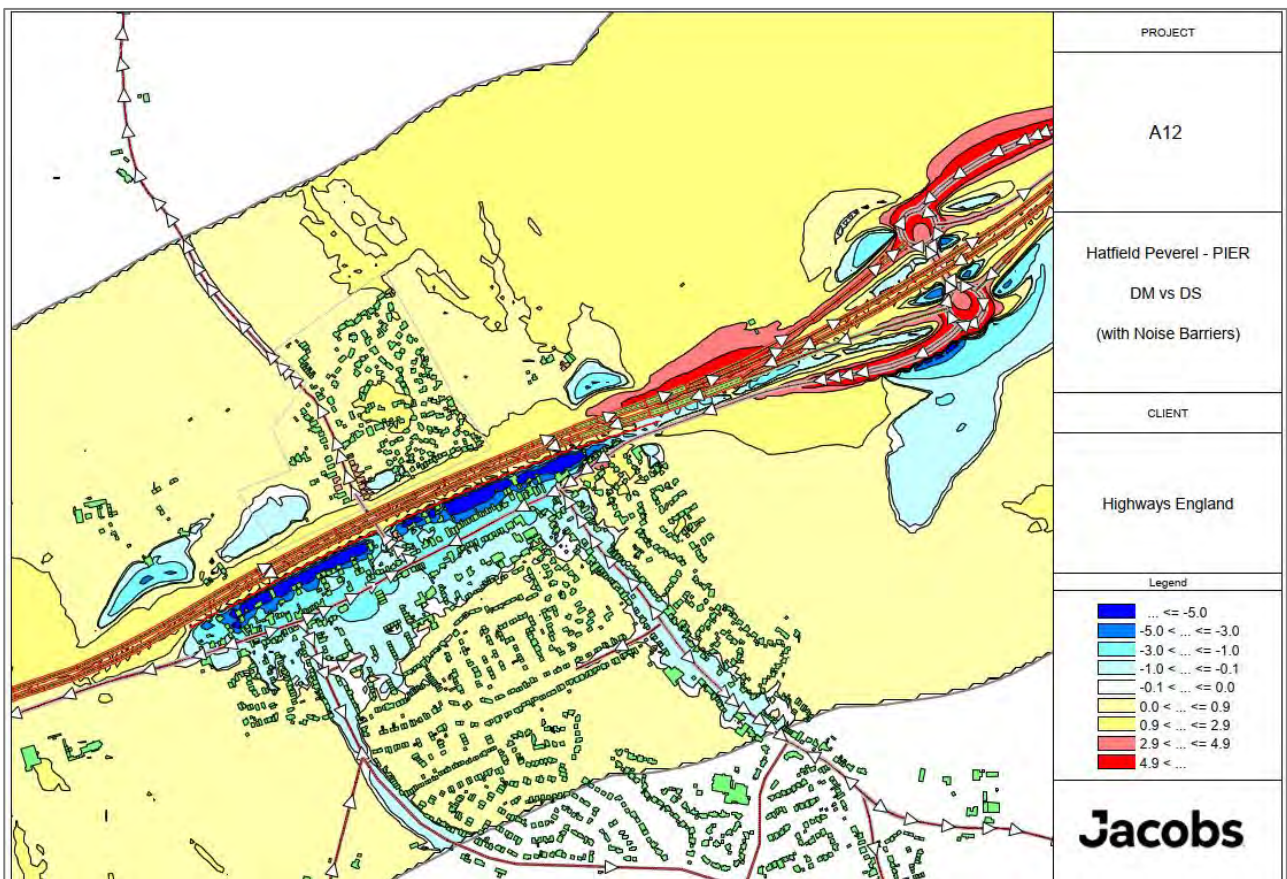
**Table 2.5 Environmental effects from removing noise barriers at Hatfield Peverel and using a surface with increased noise reducing properties**

Aspect	Change in effects	Change in mitigation
Landscape	<p>The PEIR assessment assumed that the existing highway vegetation would be removed to facilitate the widening and construction of retaining walls. This would result in a significant effect during construction as residents would be exposed to views of the A12 and construction activity. As a worst-case, it is assumed this vegetation loss would occur with or without a noise barrier, therefore no change to the effect during construction reported in Chapter 8 of the PEIR is predicted. However, it is the intention to retain vegetation where possible, which will be explored at the detailed design.</p> <p>During operation the absence of the noise barrier would mean that views towards the A12 would remain open, particularly from upper storeys. However, with or without the barrier these effects are assessed as significant due to tree loss and the limited space available for replanting for both scenarios.</p>	<p>Whilst some replacement planting may be possible it is unlikely that it would be sufficient to provide a level of screening similar to existing due to limited space. This would also have applied if a noise barrier was in place, although the noise barrier itself would have provided a visual screen.</p>
Noise and vibration	<p>At PEIR (Chapter 12), the provision of a 3m high noise barrier at the top of the cutting on the southern side of the A12 was proposed. This would have provided the following decreases in noise:</p> <ul style="list-style-type: none"> <li>• 1-3 dB(A): 142 receptors</li> <li>• &gt;3 dB(A): 73 receptors</li> </ul> <p>The change from reducing the noise by barriers to reducing the noise at source via a surface with increased noise reducing properties would have a more widespread benefit throughout Hatfield Peverel. In addition, the use of surfacing as the solution would reduce the noise on both sides of the A12 and not just the southern side as the noise barrier would have. With the proposed surface with increased noise reducing properties, the corresponding figures are:</p> <ul style="list-style-type: none"> <li>• 1-3 dB(A): 373 receptors</li> <li>• &gt;3 dB(A): 76 receptors</li> </ul> <p>These results show more receptors receiving a reduction in noise using the surface with increased noise reducing properties than the provision of the southern noise barrier.</p> <p>The change in noise for the with and without scheme scenarios are shown below. Plate 2.1 shows the change in noise level with the southern noise barrier (as presented at PEIR) and Plate 2.2 shows the change in noise level with the surface with increased noise reducing properties.</p>	<p>The southern noise barrier would be removed from the design. A surface with increased noise reducing properties would be added to the design through Hatfield Peverel.</p>

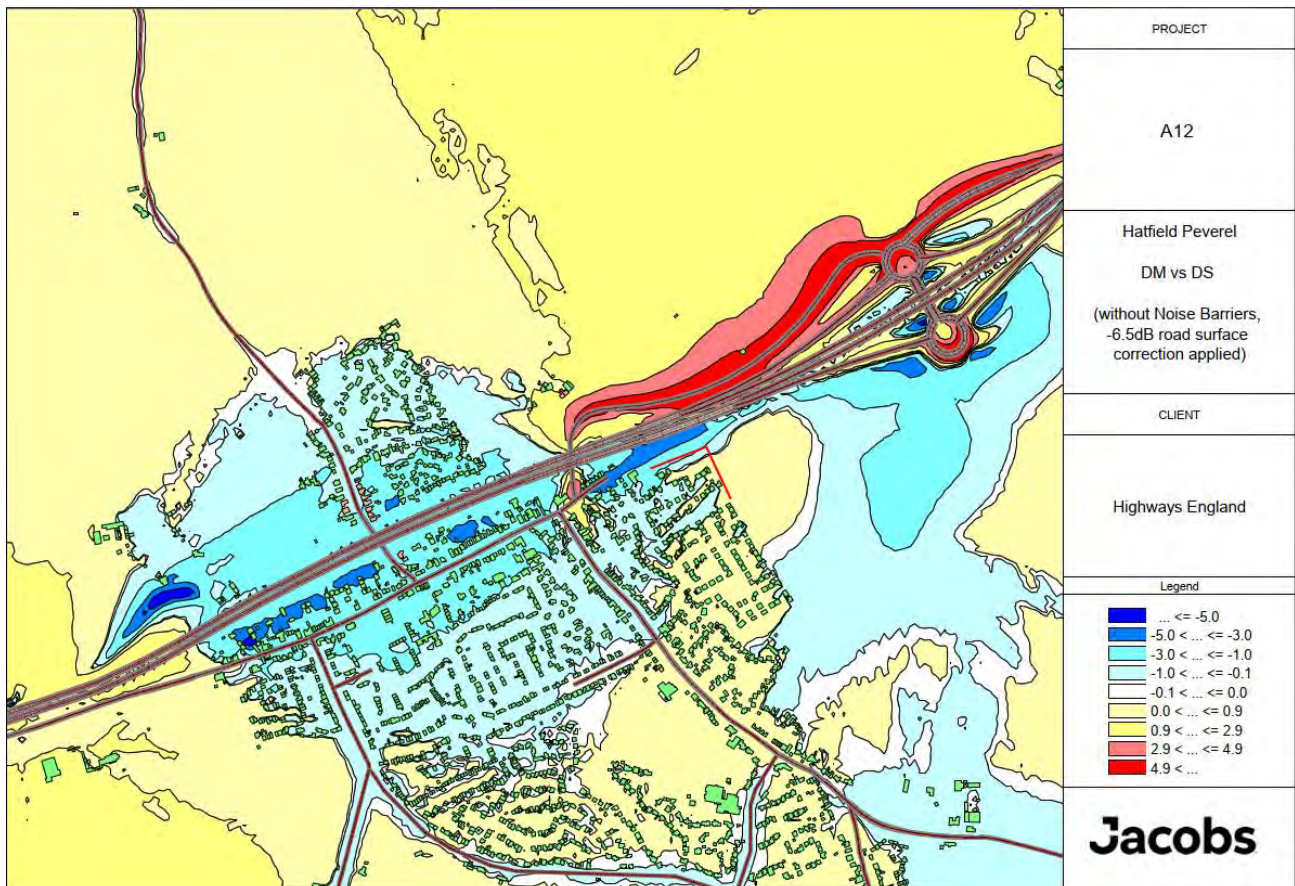


Aspect	Change in effects	Change in mitigation
Population and health	The proposed surface with increased noise reducing properties is predicted to reduce noise levels for a greater number of people which would improve noise-related health outcomes. Without a barrier, there may be an increased perception of noise due to greater visibility of traffic for those overlooking the highway, which may have a negative impact on mental wellbeing. It is likely a greater number of people would benefit from actual noise decreases than those who would disbenefit from the loss of visual screening and perceived noise increases.	No additional mitigation required.

**Plate 2.1 Noise level reductions with a southern noise barrier**



**Plate 2.2 Noise level reductions with no noise barriers and a surface with increased noise reducing properties**



## 2.7 Temporary removal of the noise barrier at Market Lane

2.7.1 Since the statutory consultation, further work has been undertaken to assess the constructability of the retaining wall between Benton Bridge and Brain Bridge. This has determined that additional land may be required to construct the retaining wall, whilst maintaining 2 lanes each way during construction. The Provisional Order Limits presented at the statutory consultation extended up to an existing noise barrier which is located between the A12 and Market Lane. Due to the additional land required to construct the retaining wall, the Provisional Order Limits have been extended to the edge of Market Lane. The existing noise barrier would need to be removed temporarily while the retaining wall is constructed, but would be re-provided once construction is complete.

2.7.2 This change in design would potentially affect the assessment conclusions for the following environmental aspects:

- Landscape – additional land take to accommodate construction of the retaining wall would result in additional vegetation loss
- Noise and vibration – removing the existing noise barrier would result in a temporary increase in noise levels; there would also be temporary noise impacts from construction plant and activities

- Population and health – increased land take and removal of the existing noise barrier could have a temporary impact on health and wellbeing while the retaining wall is constructed

2.7.3 Table 2.6 summarises the change in environmental effects and mitigation for the above aspects as a result of this design change.

2.7.4 There would be no material change in the assessment conclusions for the remaining environmental aspects assessed in the PEIR.

**Table 2.6 Environmental effects from temporary removal of the noise barrier at Market Lane**

Aspect	Change in effects	Change in mitigation
Landscape	<p>For the PEIR, it was assumed that the existing highway vegetation up to the noise barrier would be removed. With the temporary removal of the noise barrier during construction, there would be additional loss of existing vegetation to the north of the barrier. This would result in a significant adverse visual impact on residents in Market Lane, and potentially residents in other properties in the area if views are orientated towards the A12, during the construction phase. There would be direct open views of construction activity and traffic.</p> <p>The noise barrier would be reinstated following construction of the retaining wall, and trees replanted. During winter year 1 of operation, views would be intercepted by the replacement noise fence, and by summer year 15, replacement planting alongside Market Lane would have established.</p>	The noise barrier and planting along Market Lane would be reinstated.
Noise and vibration	<p>Chapter 12 of the PEIR reported no change in noise levels along Market Lane due to the existing noise barrier.</p> <p>The temporary removal of the noise barrier during the construction phase would result in short-term significant noise impacts from traffic on the A12 until the barrier is reinstated. However, there would also be a reduced speed limit on the A12 during the works as part of traffic management measures, which would reduce noise levels. The removal of the noise barrier, in combination with reduced speed limits, would result in a temporary moderate noise level increase of approximately 4 dB(A) at ground floor level for those dwellings on Market Lane that are closest to the A12. This increase would be a significant adverse effect. At the first floor level of these dwellings, there would be a minor increase in noise of approximately 1 dB(A), which would not be significant.</p> <p>Once the noise barrier is reinstated, noise levels would return to previous levels. Operational noise effects would therefore not change compared to the conclusions in the PEIR.</p> <p>Noise levels from construction activities may be higher from the temporary removal of the noise barrier, however these would be short-term and there would be no material change to the conclusions reported in the PEIR.</p>	Impacts from construction activities would be mitigated through good site practice, as set out in Chapter 12 of the PEIR.

Aspect	Change in effects	Change in mitigation
Population and health	<p>The temporary loss of the barrier, coupled with additional vegetation loss, may increase the perception of noise. This would have the potential to affect mental wellbeing for the duration of the works.</p> <p>This would be a temporary impact, and would not change the overall effect on health as reported in Chapter 13 of the PEIR.</p>	<p>No additional mitigation required.</p>

## 3 Summary

3.1.1 Section 2 of this report presents the environmental assessment of the proposed design changes introduced in Section 1. In summary, the design changes are likely to result in the following changes to significant effects compared to what was presented in the PEIR:

- Closure of Easthorpe Road – there would be no new adverse significant effects on air quality or noise levels from closing Easthorpe Road. There would be significant beneficial effects from noise level reductions along Easthorpe Road.
- Inworth Road widening – there would be no new adverse significant effects on air quality, biodiversity, or noise levels from widening pinch-points along Inworth Road. There is potential for short-term, localised landscape and visual effects due to loss of vegetation, which could also result in temporary effects on the setting of listed buildings; however, this would be mitigated by re-planting, removing the significant effects in the long-term. There is potential for an adverse significant effect on agricultural land, as land take for flood risk mitigation would make some smaller fields un-tenable. Detailed assessment of flood risk will be undertaken to determine the risk of flooding to the widened road, however, additional drainage and flood storage areas have been incorporated into the design, which would mitigate an increase in flood risk and aim to reduce the existing flood risk.
- Cadent gas main diversion – depending on the diversion corridor that is chosen, there are potential adverse significant effects on archaeological remains, local landscape character and visual receptors, woodland habitat, Whetmead Local Nature Reserve, and groundwater.
- Watercourse 21 – this is a change in flood risk mitigation, and is anticipated to result in negligible impact on flood risk subject to ongoing hydraulic modelling (no new significant effects).
- Junction 21 northern link road – there would be no new adverse significant effects on air quality, noise levels or population and health from using Wellington Bridge as a northern link road to junction 21. There would be significant beneficial effects from noise level reductions along The Street east of Maldon Road.
- Removing noise barrier through Hatfield Peverel – there would be no new adverse significant effects on air quality, landscape, noise levels or population and health from removing the noise barrier through Hatfield Peverel and using a road surface with increased noise reducing properties. Although the significant beneficial reductions in noise levels (greater than 3 dB(A)) are similar between the noise barrier and the surface with increased noise reducing properties, there would be far more properties benefitting from noise reductions (between 1 and 3 dB(A)) with the proposed surfacing.

- 
- Temporary removal of the noise barrier at Market Lane – there would be new adverse significant visual effects during the construction period while the noise barrier is temporarily removed and vegetation is cleared; vegetation would be replanted, removing the significant effect in the long-term. There would be new adverse significant noise effects, however, these would be short-term for the duration of the works only; once the noise barrier is reinstated, the noise levels would reduce to previous levels, meaning there are no new long-term significant effects.

## Appendix A Cadent gas main diversion

### A.1 Introduction

- A.1.1 An existing high pressure gas pipeline (HPP), owned and operated by Cadent Gas Limited (Cadent), runs parallel to the A12 between Maldon Road bridge (B1018) and Colemans bridge (B1389). The HPP would be affected by the proposed widening of the A12 (the 'proposed scheme') and would therefore need to be diverted.
- A.1.2 The PEIR identified the need to divert the HPP, however, the diversion route, including associated land within the Provisional Order Limits to accommodate the diversion, was not shown in the statutory consultation materials as the route of the diversion was unknown. Further design work has been undertaken since the statutory consultation to identify potential diversion routes. This appendix has therefore been produced to assess the environmental effects of the HPP diversion options, in support of the supplementary consultation for the proposed scheme.
- A.1.3 Cadent have been approached for comment regarding the impact on the HPP and to seek solutions for proposed diversion(s) to facilitate the permanent A12 widening, and construction works associated with it.
- A.1.4 This appendix provides a preliminary environmental assessment of potential options for the HPP diversion. The final option to be taken forward will be chosen by Cadent, as the statutory utility undertaker. More detailed assessment will be undertaken on the potential diversion options for presentation in the Environmental Statement which will be submitted with the Development Consent Order (DCO) application.
- A.1.5 The size and characteristics of the HPP means that the diversion works alone could be considered a Nationally Significant Infrastructure Project (NSIP). The thresholds for this are as follows:
- 1) Pipeline is wholly or partly in England
  - 2) Either: a) the pipeline must be more than 800mm in diameter and more than 40km in length; or, b) the construction of the pipeline must be likely to have a significant effect on the environment
  - 3) Pipeline must have a design operating pressure of more than 7bar gauge (barg)
  - 4) Pipeline must convey gas for supply (direct or indirect) to at least 50,000 customers, or potential customers for one or more gas suppliers
- A.1.6 Cadent have provided details of the existing pipeline, which have been considered against the criteria above. It has been confirmed that the HPP falls within the threshold of 1), 3) and 4). The HPP does not extend for 40km, however, if the HPP diversion route(s) cause significant environment effects, then the HPP diversion would be considered an NSIP under the Planning Act 2008.

## A.2 Scheme description

### Diversion options

A.2.1 To the east of Witham, the existing HPP main runs north-south on the southern side of the A12. The 600mm diameter HPP operates at a pressure of 15barg and has an assumed maximum operating pressure of 19barg.

A.2.2 The section of HPP that is relevant for the supplementary consultation starts east of Maldon Road and runs adjacent to the A12 before feeding into an existing Cadent Above Ground Installation called Little Braxted Pressure Reduction Station, south-west of Coleman's Bridge. The route is shown on Figure 1, which is provided at the end of this report.

A.2.3 The works to widen the A12 as part of the proposed scheme would cause two principal pinch-points that would most likely require diversion of the existing HPP into a new corridor. The two pinch-points are:

- where the HPP main passes between the A12 and existing housing and church by Maldon Road
- where the main passes between the A12 and Whetmead Local Nature Reserve (LNR), which contains a historic landfill and therefore is potentially contaminated

### Maldon Road

A.2.4 It is assumed that Olivers Bridge (which carries the A12 over Maldon Road) would be demolished and replaced as part of the proposed scheme, which would not be possible to construct with the HPP in its current position. The Provisional Order Limits, as shown at statutory consultation, did not allow for sufficient space to divert the HPP away from the proposed A12 works and maintain the required distance of a gas main of this size from residential properties.

### Whetmead LNR

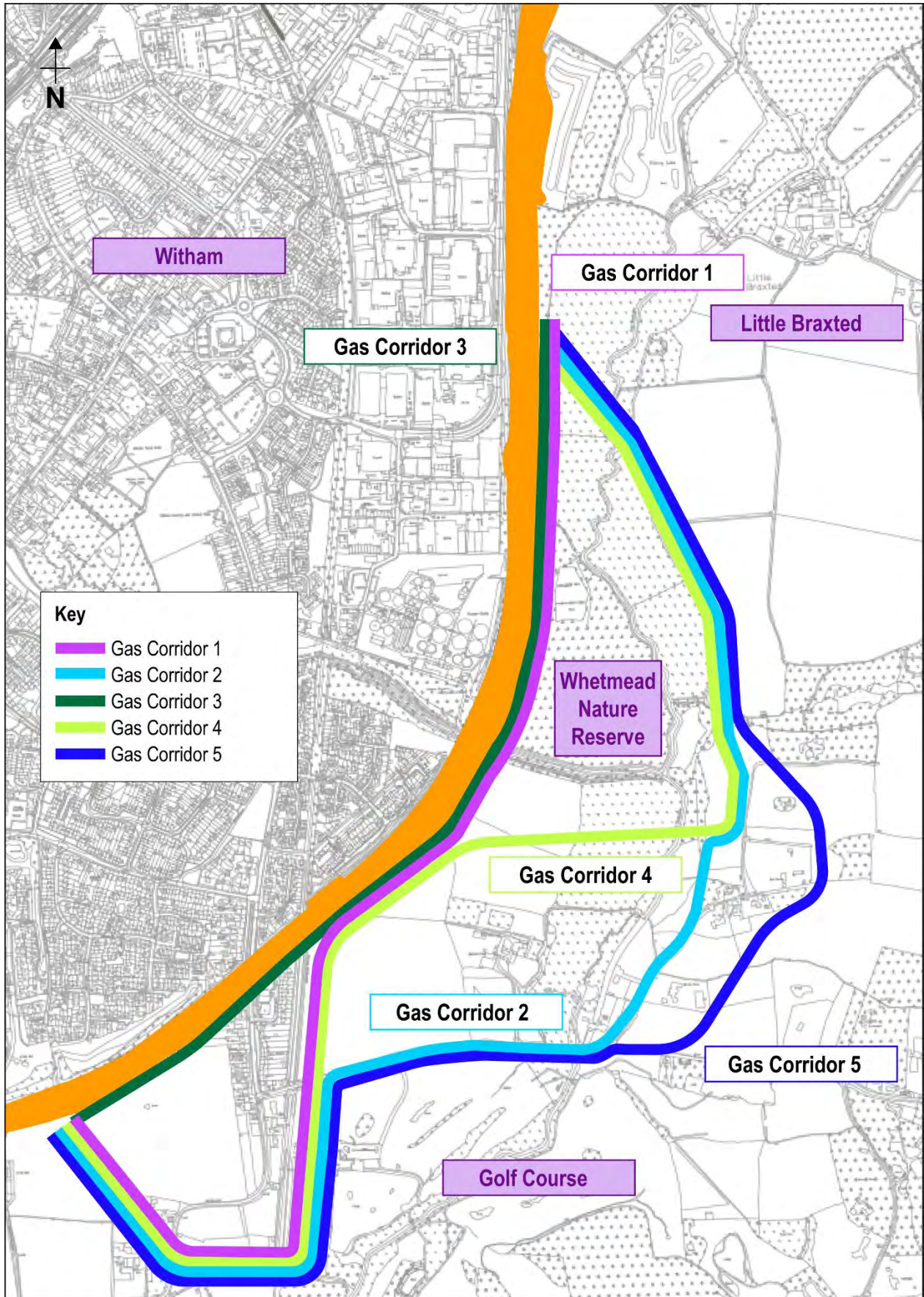
A.2.5 The exact location of the historic landfill within Whetmead LNR and any potential contamination through leaching is not currently known. Ground investigations to establish this are being planned. Following the ground investigations, it may be possible to establish a corridor between the proposed scheme and the contaminated land into which the HPP could be diverted. Alternatively, there may be engineering solutions to remediate the contamination. It is currently unknown whether a suitable engineering solution for an operational gas main, acceptable to Cadent, can be found in or adjacent to the contaminated land.

### Diversion corridors

A.2.6 Plate A.1 shows the approximate routes of the five diversion corridors which are currently being considered. Figure 1 shows these in more detail. All corridors divert from the existing HPP at approximately NGR (national grid reference) TL 821 130, west of Maldon Road (B1018), and re-join the existing HPP at approximately NGR TL 830 144, south-west of Little Braxted.



Plate A.1 Approximate routes of the diversion corridors



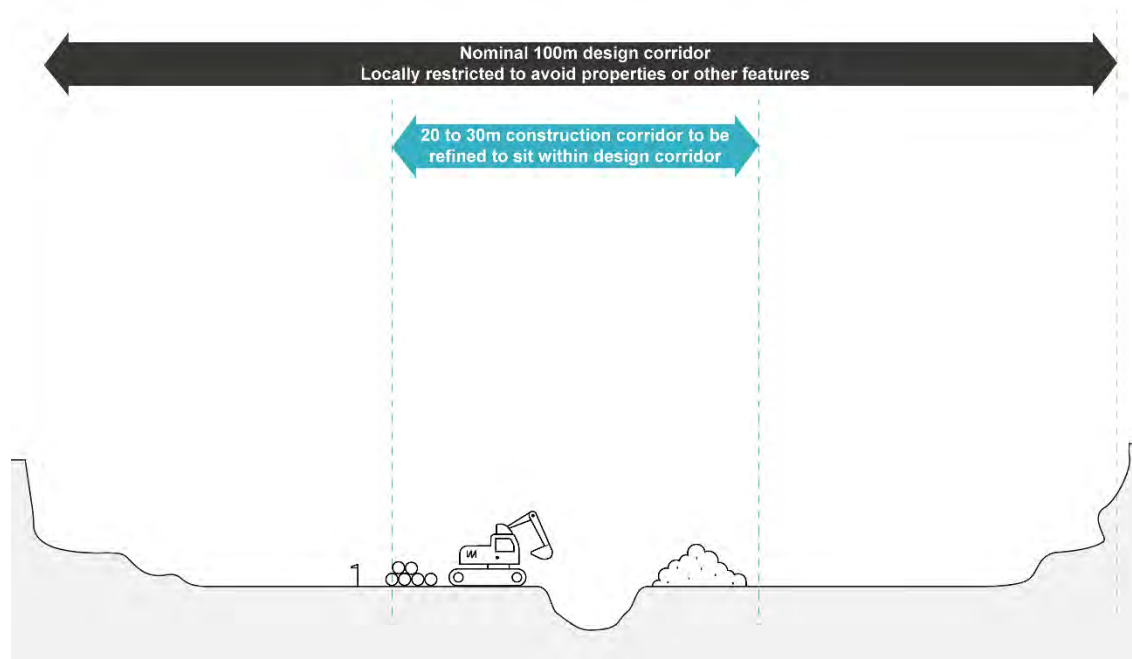
- Corridor 1 – Diverts south-east, away from the A12 and around Maldon Road and then travels back north-east to follow the existing A12.
- Corridor 2 – Diverts south-east, away from the A12 and around Maldon Road and then travels further east along Blue Mills Hill where it crosses the River Blackwater. It then travels north-east along Ishams Chase to divert around Whetmead LNR, avoiding the potential contaminated land, before continuing north towards the A12.
- Corridor 3 – Follows as closely as possible to the existing A12 mainline.
- Corridor 4 – Diverts south-east, away from the A12 and around Maldon Road and then returns north-east to run alongside the existing A12 mainline before diverting east away from the A12 again, crossing the River Blackwater to go around Whetmead LNR, avoiding the potential contaminated land, before continuing north towards the A12.
- Corridor 5 - Diverts south-east, away from the A12 and around Maldon Road and then travels further east than Corridor 2 to divert around the residential properties along Ishams Chase and Whetmead LNR, avoiding the potential contaminated land, before continuing north towards the A12.

A.2.7 There are also minor changes to the Provisional Order Limits near junction 22 to divert the HPP, but these are not considered to have significant effects, so this appendix focuses on the five corridors described above between Maldon Road and south-west of Little Braxted, where a significant diversion may occur.

### **Construction constraints**

A.2.8 A nominal 100m corridor is being included for each diversion option as it is anticipated that Cadent will require a corridor of approximately 50m into which to design a HPP of this size. The actual corridor for construction would typically be much narrower than this. Plate A.2 shows a typical 20m to 30m working width within a nominal 100m corridor for design flexibility.

## Plate A.2 Typical section indicating working width for 600mm HPP diversion



- A.2.9 Following construction and once operational, Cadent would require an easement over the entire length of their apparatus and routes to access the HPP from local roads.
- A.2.10 For each of the diversion options a nominal 100m corridor provides flexibility to avoid key features such as residential properties, important environmental features, or engineering design features from the widened A12. Additionally, in certain locations the corridor has been widened beyond 100m to allow for future design flexibility and landowner preferences; and in some locations it has been narrowed locally to avoid residential and other buildings.
- A.2.11 It is expected that construction would take in the region of four to eight months, however, this is dependent upon the final route taken, and any complexities involved in trenchless techniques for river crossings, seasonal environmental constraints, road crossings, and clashes with other works. The works would be transient, which means that construction would take place in one location, before moving on to the next, so that disruption is not taking place across the entire corridor throughout the construction programme. Final connections would be undertaken after pipelaying and the associated testing has been completed.

## A.3 Assessment methodology

### Environmental assessment methodology

- A.3.1 This appendix presents the environmental assessment of the potential HPP diversion corridors undertaken in line with the general standards set out within the Design Manual for Roads and Bridges (DMRB) LA 104 Environmental

Assessment and Monitoring, as well as the aspect-specific DMRB standards<sup>1</sup>. DMRB is the established guidance for assessing the environmental impacts of highway schemes and has been developed by National Highways in collaboration with relevant stakeholders. DMRB has recently undergone an extensive update to capture the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

A.3.2 The assessment presented in this appendix has followed the general assessment methodology set out in Chapter 5 of the PEIR. Where relevant, the environmental assessment has drawn on relevant topic guidance and best practice. More details on the methods used for each environmental aspect can be found within Chapters 6-15 of the PEIR. The PEIR and its associated figures can be found online on the proposed scheme statutory consultation website:

<https://highwaysengland.citizenspace.com/he/a12chelmsford-to-a120-widening-consultation-june21/>

A.3.3 This appendix has been prepared at an interim stage of the preliminary design process and therefore contains more than one potential diversion corridor for the HPP. Stakeholder feedback received during the targeted consultation will be considered and could influence the design. There could therefore be changes to the corridors to accommodate changes in temporary working areas, or changes in the permanent footprint associated with the design. The corridors shown on Figure 1 are considered the likely envelope that the diversion design will sit within, which are likely to be refined to a 20m to 30m construction width as the design is agreed with Cadent.

A.3.4 This appendix therefore represents a 'snap-shot in time' of the ongoing environmental assessment process. It does not report the full results of the Environmental Impact Assessment (EIA), which will be presented in the upcoming Environmental Statement for the proposed scheme.

A.3.5 The information presented in this appendix is based on assessment and survey data available at the time of writing.

### Surveys

A.3.6 No additional field surveys have been undertaken for the potential HPP diversion corridors at this stage. The assessment of the corridors in this appendix is therefore based on desk studies, and survey data from the wider proposed scheme which are available as described in the PEIR. Where data gaps or uncertainty in assessment conclusions exist at this stage, this is stated in the relevant aspect section in Section A.4 of this appendix.

A.3.7 Ecology and tree surveys (including identification of potential veteran trees) have not been carried out for the full extent of the area that would potentially be affected by the corridors.

---

<sup>1</sup> DMRB environmental standards can be found at:  
[https://www.standardsforhighways.co.uk/dmrb/search?discipline=SUSTAINABILITY\\_AND\\_ENVIRONMENT](https://www.standardsforhighways.co.uk/dmrb/search?discipline=SUSTAINABILITY_AND_ENVIRONMENT)

A.3.8 Additional field surveys for areas which have not been surveyed within the Provisional Order Limits will be undertaken as required prior to preparation of the Environmental Statement.

### **Assumptions**

A.3.9 The assessment of effects presented in Section A.4 is based on the following assumptions:

- All river crossing(s) would be installed using trenchless techniques. This could be techniques such as horizontal directional drilling.
- Approximately 1m of material (dependent on the land use at ground level) would be required to cover the HPP. Given the diameter of the HPP, and any additional excavation for bedding materials, the base of the excavation would typically be 1.8m to 2m deep. This does not apply when using trenchless techniques, or when other infrastructure, such as drainage, needs to be avoided.
- Diversions may be carried out live, so significant working areas known as stopple pits would be constructed at the tie in areas. These would be approximately 2m to 3m deep and 20m x 20m to 30m x 30m in size.
- Standard mitigation would be employed throughout the construction phase. This is defined in the PEIR as measures required regardless of the EIA because they are generally imposed through legislative requirements or standard sector practices (e.g. implementing considerate contractor practices to reduce nuisance from site work). These measures would be captured in an Environmental Management Plan (EMP). A first iteration of the EMP will be submitted with the DCO application.
- Similar construction processes and plant would be used for each diversion corridor. The primary differentiator between the corridors would therefore be route alignment and length.
- The air quality impacts are considered within 200m of the corridors. Air quality impacts beyond this are unlikely.
- For the purposes of DMRB thresholds for air quality assessment, it is assumed that there would be less than 200 heavy goods vehicle (HGV) movements per day on any associated road throughout the duration of the construction period.
- The extent of the dust risk potential to the receiving environment is considered to be large. This is determined by the size of the development and the presence of sensitive receptors. This then confirms the level of mitigation to be applied.
- No piling work would be required.

- 
- The baseline context is as per the current situation and does not take account of vegetation loss and mitigation that might occur as part of the wider proposed scheme.
  - Where present, vegetation loss has been assumed within the 20m to 30m construction working width (as shown on Plate A.2), plus a metre either side of this to account for potential impacts on tree roots. There would be potential limitations on replanting trees within the HPP easement after construction is complete.
  - An imported surround material would be added to the pipe trench before backfilling.
  - Road crossings and connections may need to be installed at night or weekends to minimise traffic disruption. No other night working would be required.
  - Diversion corridors 1 and 3 would partly (and wholly in the case of corridor 3) be located adjacent to the A12. Environmental impacts from these sections of the corridors would therefore already occur as a result of the main works for the proposed scheme (i.e. the A12 widening). These impacts are, however, included in Section A.4 of this appendix to present a full comparison of impacts between the five diversion corridors.

---

## **A.4 Assessment of effects**

- A.4.1 Tables A.1 to A.5 provide a summary of the key impacts and constraints, as well as the assessment of effects, for each of the diversion corridors. Mitigation measures have been developed for this preliminary assessment to avoid or reduce environmental effects. Consideration of these mitigation measures has been taken into account when determining the significance of effects.
- A.4.2 Most impacts are within the construction phase, as once the HPP is installed there would be no above ground infrastructure. However, some of the construction effects might extend into the operational phase due to the need to maintain an easement; for example, it may not be possible to re-provide landscape planting along the easement.
- A.4.3 Figure 2, provided at the end of this report, depicts the environmental constraints discussed within Tables A.1 to A.5. There is a separate drawing for each corridor.
- A.4.4 Where multiple impacts affect the same receptor or receptor group, or where there are interactions with third-party projects, there is the potential for cumulative effects. This will be reported in the Environmental Statement which will be submitted as part of the DCO application for the proposed scheme.

**Table A.1 Preliminary assessment of effects for diversion corridor 1**

Aspect	Key constraints and impacts	Assessment of effects
<b>Corridor 1</b>		
Air quality	<p>The key constraints for this corridor are human receptors, potential receptors on the Western Industrial Estate and ecological receptors located within 200m of the corridor, which are susceptible to construction traffic and construction dust effects.</p> <p>This includes approximately 55 residential receptors adjacent to Maldon Road and Pantile Close (south of the A12), one residential receptor on Wickham Hill (south-east of the A12) and approximately 330 residential receptors in Witham (north-west of the A12). There may also be sensitive receptors within the Western Industrial Estate that are susceptible to dust nuisance.</p> <p>The corridor passes through the designated Whetmead LNR and Local Wildlife Site (LWS). There are also two potential veteran trees (T316 and T308) within 200m of the corridor.</p>	<p>Construction dust: With the implementation of suitable mitigation measures, to be outlined in the first iteration of the EMP, the impact of dust-emitting construction activities would be reduced so as to be not significant. Mitigation measures would include the dampening down of surfaces, planning the site layout so that machinery and dust-causing activities occur as far from receptors as practicable, erecting screens or barriers around the dust-causing activities or the site boundary and the minimising, covering or dampening down of stockpiles to prevent entrainment by wind.</p> <p>Construction traffic: The effects associated with construction traffic for this corridor are unlikely to be significant.</p> <p>Operational traffic: The HPP diversion would not influence operational traffic, therefore there would be no significant effects.</p>
Cultural heritage	<p>This corridor would cross three non-designated archaeological sites: East of Oliver's Farm, cropmarks 1 (Asset 277); the Witham to Maldon railway line (dismantled) (Asset 345); Culvert on the Witham to Maldon dismantled railway line 7 (Asset 292).</p>	<p>Construction within this corridor would potentially remove archaeological remains associated with Assets 277, 292 and 345, all assessed to be of negligible value. Trial trenching is to be conducted at Asset 277 and it is possible that its value may change once the results are known.</p> <p>It is possible that significant effects could occur to Asset 277. It is unlikely that significant effects would occur to Assets 292 and 345.</p> <p>Mitigation for the potential impacts on Asset 277 would most likely consist of detailed archaeological excavation of the affected part of the site depending on the results of the trial trenching. Mitigation for the potential impact on Assets 292 and 345 would consist of an archaeological watching brief during construction.</p>



Aspect	Key constraints and impacts	Assessment of effects
Landscape and visual	<p>Key landscape constraints:</p> <p>Corridor 1 falls within local landscape character areas A9 Blackwater River Valley and Landscape Sub Area A9A which incorporate parts of the River Blackwater and the River Brain, and existing trees and vegetation including a potential veteran tree east of the A12 (T316). The Blackwater Valley is noted for its distinctive cricket bat willow plantations.</p> <p>The Blackwater Rail Trail Country Park crosses the corridor. There are no other designations relevant to landscape in the vicinity of the corridor.</p> <p>Key potential visual receptors:</p> <p>Users of Blackwater Rail Trail Country Park, Whetmead LNR, Benton Hall Golf and Country Club and public rights of way (PRoW). Residents within properties south and east of the A12 on the edge of Witham.</p>	<p>Potential for significant effects on local landscape character and visual receptors during construction due to vegetation loss, including close to the A12 which would exacerbate the prominence of highway infrastructure and the presence of construction activity, although this would be partly in the context of the existing A12.</p> <p>Potential for significant effects on local landscape character and visual receptors during operation due to vegetation loss and potential limitations on replanting trees within the HPP easement.</p>
Biodiversity	<p>Corridor 1 is likely to impact on areas of lowland mixed deciduous woodland (a priority habitat) south of Blue Mills Hill, and lowland mixed deciduous woodland and semi-improved neutral grassland within Whetmead LNR and LWS, as well as broadleaved woodland plantation to the north of Whetmead LNR/LWS. There is also potential for impacts to a pond, arable field margins, and hedgerows between Whetmead LNR/LWS and Maldon Road, all of which are also priority habitats.</p> <p>Potential to impact ecological receptors previously identified in this area, including common reptiles (grass snakes <i>Natrix helvetica</i>, common lizard <i>Zootoca vivipara</i> and slow worm <i>Anguis fragilis</i>), breeding birds, bats (at least one confirmed roost is located within corridor 1, low status badger <i>Meles meles</i> setts located on the boundary of the existing A12 and species of principal importance such as polecat <i>Mustela</i></p>	<p>Loss of woodland is difficult to mitigate due to the time required to create the same habitat and potential restrictions prohibiting tree planting over the HPP easement. Loss of woodland habitats would lead to a moderate adverse significance of effect.</p> <p>Potential GWDTE within Whetmead LNR and LWS could be directly impacted by the corridor resulting in a moderate adverse effect.</p> <p>Significant effects to other ecological receptors are considered unlikely, as mitigation would likely reduce the effects. Any impacts to badger setts may require further surveys and application of a suitable licence from Natural England prior to the construction phase.</p> <p>A licence obtained for these works would likely not require construction of an alternative artificial sett unless updated surveys deemed the sett to have changed significantly in use and is a higher value (i.e. considered a main sett).</p>

Aspect	Key constraints and impacts	Assessment of effects
	<p><i>putorius</i>, brown hare <i>Lepus europaeus</i>, common toad <i>Bufo bufo</i> and hedgehog <i>Erinaceus europaeus</i> which may be present in habitats within the footprint of the construction area.</p> <p>Whetmead LNR/LWS is also known to support a diverse assemblage of terrestrial invertebrate species, including 12 species of conservation importance, such as the small heath butterfly <i>Coenonympha pamphilus</i>. The invertebrate interest is predominantly associated with open habitats such as the semi-improved neutral grassland.</p> <p>Air quality changes could occur, in particular through dust during construction works, with resulting effects on sensitive habitats and Whetmead LNR/LWS.</p> <p>Whetmead LNR/LWS is a potential groundwater dependent terrestrial ecosystem (GWDTE) (of moderate groundwater dependency) and could potentially be impacted by changes to groundwater.</p>	<p>Additional bat emergence and re-entry surveys or climbing surveys of trees may be required between May and September to identify the presence of any bat roosts prior to works. Impacts to roosts could be mitigated through timing of works and provision of bat boxes, thus ensuring no significant effects.</p> <p>Clearance of habitats in a sensitive manner under ecological supervision would reduce impacts to other species. Creation of grassland habitats post construction would result in adverse impacts on habitat being temporary, as new habitat would be created in the long term.</p> <p>With the implementation of suitable mitigation measures, to be outlined in the first iteration of the EMP, the impact of dust-emitting construction activities on Whetmead LNR/LWS would be reduced so as to be not significant.</p>
Geology and soils	<p>This corridor crosses the western edge of a historic landfill (Whetmead). The landfill is to be investigated to determine nature and extent of contamination. Potential issues exist such as ground gas, removal and disposal of waste material and worker health and safety.</p> <p>The corridor is located on agricultural land classification (ALC) grade 2 and 3 agricultural land and is underlain by a secondary A aquifer.</p>	<p>Whilst there are cost and safety implications of works in the historic landfill, it is unlikely there would be significant effects.</p> <p>Where the route cuts through the historic landfill there is the potential for the creation of contamination pathways from the landfill into the underlying secondary A aquifer (see also road drainage and the water environment section below). However, the works will be designed to avoid impacts on the aquifer occurring.</p> <p>The design would look to minimise works within landfill materials to reduce cost and disposal of contaminated soils.</p> <p>The effect on agricultural land would be temporary during construction and would be restored during operation.</p>

Aspect	Key constraints and impacts	Assessment of effects
Materials assets and waste	<p>The material assets and waste aspect considers the impact of construction on national material recovery targets, regional recycled aggregate targets, sub-regional mineral sterilisation and regional landfill capacity.</p> <p>Whilst constructing within this corridor would result in increased materials consumption, minerals sterilisation and waste generation when compared with a do nothing scenario, these impacts would ultimately be assessed in absolute terms as part of the Environmental Statement being prepared for the proposed scheme.</p> <p>This option also has the potential to generate contaminated cut material within the footprint of the historic landfill (Whetmead), and would therefore need to import clean backfill materials.</p>	<p>Given the scale and nature of the proposed HPP diversion works, a slight adverse effect is likely for this option, which would not be significant. This is based on the application of professional judgment to the significance criteria provided in Tables 3.13 and 3.14 in the DMRB LA 110 Material Assets and Waste standard.</p> <p>The design would look to minimise the consumption of material assets, unnecessary sterilisation of mineral resources, and the generation of waste throughout the lifecycle of the pipeline diversion in line with the extant mitigation measures proposed for the main scheme.</p>
Noise and vibration	Residential receptors on the western side of Maldon Road.	There would be a temporary increase in noise at the rear of some houses to the west of Maldon Road. The increase in noise is unlikely to be significant due to the nature of the work and the relatively short duration that the works would be in any single location.
Population and health	<p>The following key receptors have been identified:</p> <ul style="list-style-type: none"> <li>• Three arable agricultural landholdings, one area of grazing land associated with one of the three arable agricultural landholdings, and one area of plantation woodland associated with a fourth agricultural landholding.</li> <li>• Benton Hall Golf and Country Club.</li> <li>• Blackwater Rail Trail Country Park and cycle route, and Whetmead LNR.</li> <li>• Two PRow, Blue Mills Hill and Maldon Road.</li> </ul>	<p>Temporary land acquisition and disruption to access in affected land parcels forming part of the affected agricultural landholdings. Permanent easement rights would also be required and there may be limitations on replanting of trees and hardwood plants within the area subject to easement. No impact on the continued viability of these land uses is anticipated. No significance of effect on agricultural landholdings is provided at this stage of assessment.</p> <p>Temporary land acquisition and disruption of access to grounds of Benton Hall Golf Club and Country Club, with permanent easement rights also required. The magnitude of effect on this receptor is assessed as moderate adverse during construction and minor adverse during operation. The significance of effect on business</p>

Aspect	Key constraints and impacts	Assessment of effects
	<ul style="list-style-type: none"> <li>Three residential dwellings located on the west side of Maldon Road immediately south of Blue Mills Hill, and a fourth located further south opposite Oliver's Farm Industrial Estate.</li> </ul>	<p>would be slight adverse during construction and slight adverse during operation.</p> <p>Temporary disruption of access and amenity of the Blackwater Rail Trail cycle route and country park, Whetmead LNR as well as two PRoW, Blue Mills Hill and Maldon Road. The magnitude of impact on these receptors would be minor adverse during construction and no change during operation, and the overall significance of effect on walkers, cyclists and horse-riders (WCH) and community assets would be slight adverse during construction and neutral to slight beneficial (for WCH) or slight adverse to neutral (for community assets) during operation.</p> <p><i>Note: An assumption has been made that the final routing would avoid direct impacts on residential properties and built infrastructure which forms part of Benton Hall Golf Club and Country Club (including proposals under planning application ref: 19/01980/FUL, Braintree District Council).</i></p>
<p>Road drainage and the water environment</p>	<p>Surface water constraints include the River Brain and ordinary watercourses 9a and 32. The River Brain is designated as a main river and Water Environment Regulations (WER) designated water body and currently has a moderate status for both overall and physico-chemical quality elements. This corridor crosses over ordinary watercourse 32 in two locations.</p> <p>There may be constraints relating to construction methodology due to areas of predicted flooding associated with each watercourse.</p> <p>From a groundwater perspective, the diversion of the HPP would intercept two secondary A aquifers which are part of the Essex Gravel WER groundwater body. This corridor lies upgradient of two licensed groundwater abstractions located approximately 120m and 150m south of the route. These</p>	<p>Depending on the construction works, anticipated water quality and hydromorphological impacts would include the release and mobilisation of fine sediment. This could be caused by construction activities increasing sediment runoff within river catchments or in-channel working causing disturbance of local bed and banks, both of which could result in a deterioration of water quality. As it is assumed the HPP would be tunnelled under watercourses, impacts caused by in-channel working are unlikely. Spillage of construction materials and chemicals (e.g. oils, lubricants, cements, etc.) could also have potential adverse impacts. Given the scale of the proposed corridor, a (short-term) slight adverse effect is likely for all identified watercourses receptors. For watercourses with WER status, the proposed HPP diversion works are not anticipated to cause any change of status for any measured parameter.</p>

Aspect	Key constraints and impacts	Assessment of effects
	<p>abstractions are used for irrigation purposes and do not have a defined Source Protection Zone. This corridor also cuts through a historic landfill which has been designated as Whetmead LNR and is a potential GWDTE (of moderate groundwater dependency).</p>	<p>Mitigation measures to reduce water quality impacts would be employed, e.g. construction drainage would be managed and treated as required, before discharge to receiving watercourses, and good construction practices would be followed.</p> <p>During construction, groundwater may be intercepted where the HPP is to be tunnelled under the watercourses and elsewhere in shallow trenches (up to 1.8m deep). However, any dewatering effect is expected to be localised and short lived. Given the scale of the aquifer and the expected localised effect, slight adverse effects to the secondary A aquifers are predicted. During construction, however, the groundwater flow to the two nearby licensed abstractions could be limited hence reducing the abstractions yield. This could create minor adverse impacts in the short term with a moderate significance of effect.</p> <p>The potential GWDTE within Whetmead LNR could be directly impacted by the footprint of the HPP installation, but this could also result in a wider impact on any GWDTE present immediately downgradient as groundwater flows could be temporarily altered or reduced resulting in moderate adverse effects.</p> <p>Where the route cuts through a historic landfill, there is the potential for the creation of contamination pathways from the landfill into the underlying secondary A aquifer (see geology and soils section).</p> <p>Some temporary mitigation may be required should construction works require temporary storage areas or worksites within the floodplain, however with these it is unlikely that there would be any flood risk significant effects.</p>

Aspect	Key constraints and impacts	Assessment of effects
Climate	<p>Construction within this corridor would result in increased greenhouse gas (GHG) emissions. GHG emissions would arise as a result of the transportation and consumption of raw materials on-site (and associated embodied carbon), the consumption of fuel and energy by on-site machinery and plant and employees travelling to and from the site, and as a result of carbon sequestered in soil and vegetation being released during the works.</p> <p>Given the subterranean nature of the HPP diversion, it is considered that the pipeline itself would not be particularly vulnerable to future changes in climate. As such, future changes in climate are considered unlikely to have a significant impact on this corridor.</p>	<p>The magnitude of the GHG emissions associated with this option are considered likely to be negligible compared to those associated with the wider proposed scheme, and in particular in comparison to UK carbon budgets (against which DMRB LA 114 advises that GHG emissions attributable to highways schemes should be compared). As a result, the likely increase in GHG emissions associated with this option is considered to be not significant.</p>

**Table A.2 Preliminary assessment of effects for diversion corridor 2**

Aspect	Key constraints and impacts	Assessment of effects
<b>Corridor 2</b>		
Air quality	<p>The key constraints within this corridor are human receptors, potential receptors on the Western Industrial Estate and ecological receptors located within 200m of the corridor, which are susceptible to construction traffic and construction dust effects.</p> <p>This includes approximately 55 residential receptors adjacent to Maldon Road and Pantile Close, one residential receptor on Wickham Hill, approximately 10 residential receptors adjacent to Ishams Chase and Blue Mills Hill (south-east of the A12) and approximately 100 residential receptors in Witham (north-west of the A12).</p> <p>There may also be sensitive receptors within the Western Industrial Estate that are susceptible to dust nuisance.</p> <p>The corridor is located within 200m of the designated Whetmead LNR and LWS and one potential veteran tree (T316).</p>	<p>Although corridor 2 would impact different receptors than corridor 1, the effects would not be significant, and are therefore as described for corridor 1.</p>
Cultural heritage	<p>This corridor would cross five non-designated archaeological sites: East of Oliver's Farm, cropmarks 1 (Asset 277); Culvert on the Witham to Maldon dismantled railway line 7 (Asset 292); Site of Machin's Mill or Blue Mills (Asset 333); the Witham to Maldon railway line (dismantled) (Asset 345); Cropmarks S of Little Braxted (Asset 349).</p> <p>This corridor would be close to two Grade II* listed buildings: Blue Mills (Asset 332) and Mathyns (Asset 334); and two Grade II listed buildings: Barn at Ishams Chase (Asset 344) and Blue Mills Bridge (Asset 330).</p>	<p>Construction within this corridor would potentially remove archaeological remains associated with Asset 333 assessed to be of low value, and Assets 277 and 349, both assessed to be of negligible value. Trial trenching is to be conducted at Asset 277 and its value may change once the results are known.</p> <p>It is possible that significant effects could occur to Assets 277, 333 and 349. It is unlikely that significant effects would occur to Assets 292 and 345.</p> <p>Mitigation for the potential impacts on Assets 277, 333, and 349 would most likely consist of detailed archaeological excavation of the affected part of each site depending on the results of the trial trenching.</p>

Aspect	Key constraints and impacts	Assessment of effects
		<p>Mitigation for the potential impact on Assets 292 and 345 would consist of an archaeological watching brief during construction.</p> <p>Construction within this corridor, in close proximity to the listed buildings, would result in impacts on their setting from noise and visual intrusion associated with construction. Such impacts would be temporary and of short-term duration and are considered unlikely to be significant.</p> <p>Impacts on the setting of historic buildings during construction would be mitigated through the use of best practice measures in line with the British Standards Institute Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (BS 5228; 2008) to minimise noise during construction.</p>
Landscape and visual	<p>Key landscape constraints: Local landscape character areas A9 Blackwater River Valley and Landscape Sub Area A9A, which incorporate the Blackwater Rail Trail Country Park, parts of the River Blackwater and the River Brain, existing trees and vegetation including distinctive willow plantations within Blackwater Valley, a potential veteran tree east of the A12 (T316), and Tree Preservation Order (TPO) east of Blue Mills Bridge (Asset 330).</p> <p>Key potential visual receptors: Users of Blackwater Rail Trail Country Park, Whetmead LNR, Benton Hall Golf and Country Club and PRoW. Residents within properties south and east of the A12 on the edge of Witham and residents within the Blue Mills area (including listed buildings such as Mathyns, Blue Mills and Barn at Ishams Chase).</p>	<p>Potential for significant effects on local landscape character and visual receptors (including within listed buildings) during construction due to vegetation loss, including potential loss of trees within distinctive plantations along the Blackwater Valley, and the presence of construction activity.</p> <p>Potential for significant effects on local landscape character and visual receptors during operation due to vegetation loss and potential limitations on replanting trees within the HPP easement, including within distinctive plantations along Blackwater Valley.</p>



Aspect	Key constraints and impacts	Assessment of effects
Biodiversity	<p>Corridor 2 is likely to impact areas of lowland mixed deciduous woodland (a priority habitat) south of Blue Mills Hill and broadleaved plantation woodland north of Whetmead LNR and LWS. There is also potential for impacts to arable field margins and hedgerows, both of which are also priority habitats.</p> <p>Potential to impact ecological receptors previously identified in this area, including common reptiles (grass snakes <i>Natrix helvetica</i>, common lizard <i>Zootoca vivipara</i> and slow worm <i>Anguis fragilis</i>), breeding birds, bats, low status badger <i>Meles meles</i> setts near Maldon Road and species of principal importance such as polecat <i>Mustela putorius</i>, brown hare <i>Lepus europaeus</i>, common toad <i>Bufo bufo</i> and hedgehog <i>Erinaceus europaeus</i> which may be present in habitats within the footprint of the construction area.</p> <p>Potential to impact ecological receptors in areas not previously surveyed as part of the proposed scheme, such as further badger setts or newly identified receptors such as dormice <i>Muscardinus avellanarius</i> due to connectivity of hedgerows within corridor 2 with Chantry Wood, Mope Wood, Grove Wood and Sparkey Wood which are fragmented from the proposed scheme by the River Blackwater.</p> <p>Because the corridor is located within 200m of the Whetmead LNR and LWS, and one potential veteran tree (T316), there is potential for air quality impacts due to dust deposition.</p>	<p>Loss of woodland is difficult to mitigate due to the time required to create the same habitat and potential restrictions prohibiting tree planting over the HPP easement. Loss of woodland habitats would lead to a moderate adverse significance of effect.</p> <p>A variety of ecology surveys would be required in areas outside the Provisional Order Limits as presented at statutory consultation for the proposed scheme to identify the presence of any additional ecological receptors along the corridor. Badger, bat roost assessment, barn owl and dormouse surveys are likely to be required.</p> <p>Based on the results of additional surveys, it may be necessary to amend working methods via a method statement, obtain a licence from Natural England or apply additional mitigation such as timing of works or provision of bat boxes. Assuming hedgerows can be reinstated and assuming creation of grassland habitats post construction, it is assessed that it is unlikely there would be significant effects to protected species.</p> <p>With the implementation of suitable mitigation measures, to be outlined in the first iteration of the EMP, the impact of dust-emitting construction activities on Whetmead LNR and LWS and the potential veteran tree would be reduced so as to be not significant.</p>
Geology and soils	<p>The corridor is located on ALC grade 2 and 3 agricultural land.</p> <p>There are no significant land quality constraints.</p>	<p>Effect on agricultural land would be temporary during construction and would be restored during operation.</p>

Aspect	Key constraints and impacts	Assessment of effects
Materials assets and waste	Key constraints and impacts are as described for corridor 1. However, corridor 2 would not be within the footprint of the Whetmead landfill, and would therefore avoid generating contaminated cut material from this constraint.	Effects are similar across all options and therefore are as described for corridor 1.
Noise and vibration	Residential receptors on the western side of Maldon Road and along Ishams Chase.	There would be a temporary increase in noise at the rear of some houses to the west of Maldon Road, and on the front of the few houses along Ishams Chase. The increase in noise is unlikely to be significant due to the nature of the work and the relatively short duration that the works would be in any single location.
Population and health	<p>The following key receptors have been identified:</p> <ul style="list-style-type: none"> <li>• One arable agricultural landholding and an area of plantation woodland belonging to a second holding. Up to seven potential additional areas of grazing or plantation woodland have been identified, belonging to a maximum of six further landowners, however it is currently unknown whether their use is commercial or domestic.</li> <li>• Benton Hall Golf Course and Country Club.</li> <li>• Blackwater Rail Trail Country Park and cycle route.</li> <li>• Five PRoW, Blue Mills Hill, Ishams Chase and Maldon Road</li> <li>• One residential property located opposite Benton Hall Golf Course and Country Club, one residential property located north of Blue Mills Hill and three on the west side of Ishams Chase.</li> </ul>	<p>The effect on agricultural land is as described for corridor 1.</p> <p>The effect on Benton Hall Golf Club and Country Club is as described for corridor 1.</p> <p>Temporary disruption to access and amenity of the Blackwater Rail Trail cycle route and country park, as well as five PRoW, Blue Mills Hill, Ishams Chase and Maldon Road. The magnitude of impact on these receptors would be negligible or minor adverse during construction, and the overall significance of effect on WCH and community assets would be slight adverse during construction and neutral to slight beneficial (on WCH) or slight adverse to neutral (on community assets) during operation.</p> <p><i>Note: An assumption has been made that the final routing would avoid direct impacts on residential properties and built infrastructure which forms part of Benton Hall Golf Club and Country Club (including proposals under planning application ref: 19/01980/FUL, Braintree District Council).</i></p>

Aspect	Key constraints and impacts	Assessment of effects
Road drainage and the water environment	<p>Surface water constraints include the River Blackwater, ordinary watercourse 32 and six unnamed watercourses (all tributaries of River Blackwater, four of which confluence on its eastern bank and two on its western bank). The River Blackwater (Combined Essex) is a main river and WER designated water body and currently has a moderate status for both overall and physico-chemical quality elements. This corridor crosses over the River Blackwater and ordinary watercourse 32 in two locations respectively.</p> <p>There may be constraints relating to construction methodology due to areas of predicted flooding associated with each watercourse.</p> <p>From a groundwater perspective the diversion of the HPP would intercept two secondary A aquifers which are part of the Essex Gravel WER groundwater body. This corridor lies upgradient of two licensed groundwater abstractions located approximately 120m and 150m south of the route. These abstractions are used for irrigation purposes and do not have a defined Source Protection Zone. There is a spring located at Ishams Barn which lies directly in the footprint of the proposed route. On the eastern side of the river the construction would take place in mainly unproductive strata which is unlikely to contain groundwater in any large volumes.</p>	<p>Effects for corridor 2 are similar to corridor 1, with the following differences:</p> <ul style="list-style-type: none"> <li>• Within the proposed route lies a spring which is likely to be destroyed during construction due to the direct nature of the works. This spring supplies a small tributary of the River Blackwater, however, given the size of this tributary compared to the river any impacts to the spring are unlikely to significantly impact the river.</li> <li>• The corridor would not cut through a historic landfill site, and would therefore not create a potential pollution pathway from the landfill to the underlying secondary A aquifer.</li> </ul>
Climate	Key constraints and impacts are similar across all corridors and therefore are as described for corridor 1.	Effects are similar across all options and therefore are as described for corridor 1.

**Table A.3 Preliminary assessment of effects for diversion corridor 3**

Aspect	Key constraints and impacts	Assessment of effects
<b>Corridor 3</b>		
Air quality	The key constraints for this corridor are the same as corridor 1 except that residential receptors include approximately 390 residential receptors in Witham (north-west of the A12), where the corridor runs parallel to the A12.	Although corridor 3 would impact different receptors than corridor 1, the effects would not be significant, and are therefore as described for corridor 1.
Cultural heritage	This corridor would cross one non-designated archaeological site: the Witham to Maldon railway line (dismantled) (Asset 345). The western end of this corridor would be immediately north of the non-designated archaeological site East of Oliver's Farm, cropmarks 1 (Asset 277).	<p>Construction within this corridor would potentially remove archaeological remains associated with Asset 345 assessed to be of negligible value. Although Corridor 3 would not be within the known boundary of Asset 277, trial trenching is to be conducted north of Asset 277 and could potentially identify further archaeological remains at the west end of this corridor.</p> <p>It is possible that significant effects could occur to any archaeological remains which might be identified north of Asset 277. It is unlikely that significant effects would occur to Asset 345.</p> <p>Mitigation for the potential impacts on Asset 345 would consist of an archaeological watching brief during construction. The need for, scope, and scale of mitigation for the potential impact on any archaeological remains which might be identified north of Asset 277 would be decided once the results of the trial trenching are known.</p>

Aspect	Key constraints and impacts	Assessment of effects
Landscape and visual	<p>Key landscape constraints:</p> <p>Local landscape character areas A9 Blackwater River Valley and Landscape Sub Area A9A which incorporate the Blackwater Rail Trail Country Park, parts of the River Blackwater and the River Brain, and existing trees and vegetation including potential veteran tree east of the A12 (T316).</p> <p>Key potential visual receptors are as described for corridor 1.</p>	<p>The effects from this corridor are as described for corridor 1.</p> <p>However, it may be possible to reduce tree loss on the floodplain if the HPP diversion can be tied into the existing HPP sooner.</p>
Biodiversity	<p>Corridor 3 is likely to impact on areas of lowland mixed deciduous woodland (a priority habitat) and semi-improved neutral grassland within Whetmead LNR and LWS, as well as broadleaved woodland plantation to the north of Whetmead LNR and LWS. There is also potential for impacts to a pond, hedgerows between Maldon Road and Whetmead LNR and LWS, and arable field margins, all of which are also priority habitats.</p> <p>All other constraints and impacts are as described for corridor 1.</p>	<p>The effects from this corridor are as described for corridor 1.</p>
Geology and soils	<p>Key constraints and impacts are as described for corridor 1.</p>	<p>The effects from this corridor are as described for corridor 1.</p>
Materials assets and waste	<p>Key constraints and impacts are as described for corridor 1.</p>	<p>The effects from this corridor are as described for corridor 1.</p>
Noise and vibration	<p>Residential receptors on the western side of Maldon Road.</p>	<p>There would be a temporary increase in noise at the rear of some houses to the west of Maldon Road and along Pantile Close. The increase in noise is unlikely to be significant due to the nature of the work and the relatively short duration that the works would be in any single location.</p>

Aspect	Key constraints and impacts	Assessment of effects
Population and health	<p>The following receptors have been identified:</p> <ul style="list-style-type: none"> <li>• Three arable agricultural landholdings and an area of plantation woodland belonging to a fourth holding.</li> <li>• Blackwater Rail Trail Country Park and cycle route.</li> <li>• One PRoW.</li> <li>• Five residential properties located on the east side of Maldon Road, immediately south of the existing A12.</li> </ul>	<p>The effect on agricultural land is as described for corridor 1.</p> <p>Temporary disruption to access and amenity of the Blackwater Rail Trail cycle route and country park, as well as one PRoW. The magnitude of impact on these receptors would be negligible adverse during construction, and the overall significance of effect on WCH and community assets would be slight adverse during construction and neutral to slight beneficial (on WCH) or slight adverse to neutral (on community assets) during operation.</p> <p>Temporary land acquisition required from five residential properties located on Maldon Road, with permanent easement rights also required. It is anticipated that the pipeline routing would ensure only the garden areas of these properties are affected, and the ongoing viability of the existing land uses would not be compromised although there would be a noticeable level of disruption for affected residents during construction and potential restrictions on garden planting during operation. The overall significance of effects on residential property and housing would be slight adverse during construction and operation.</p>
Road drainage and the water environment	<p>Key constraints and impacts are as described for corridor 1, with the following differences:</p> <ul style="list-style-type: none"> <li>• Corridor 3 would not cross ordinary watercourse 32</li> <li>• Corridor 3 would not be located close to two licensed groundwater abstractions</li> </ul>	<p>The effects from this corridor are similar to those described for corridor 1, with the exception that there would be no impact on ordinary watercourse 32 and licensed groundwater abstractions.</p>
Climate	<p>Key constraints and impacts are similar across all corridors and therefore are as described for corridor 1.</p>	<p>Effects are similar across all corridors and therefore are as described for corridor 1.</p>

**Table A.4 Preliminary assessment of effects for diversion corridor 4**

Aspect	Key constraints and impacts	Assessment of effects
<b>Corridor 4</b>		
Air quality	<p>The key constraints for this corridor are human receptors, potential receptors on the Western Industrial Estate and ecological receptors located within 200m of the corridor, which are susceptible to construction traffic and construction dust effects.</p> <p>This includes approximately 55 residential receptors adjacent to Maldon Road and Pantile Close, one residential receptor on Wickham Hill, approximately six residential receptors adjacent to Ishams Chase (south-east of the A12) and approximately 330 residential receptors in Witham (north-west of the A12).</p> <p>There may also be sensitive receptors within the Western Industrial Estate that are susceptible to dust nuisance.</p> <p>The corridor is located within 200m of the designated Whetmead LNR and LWS and one potential veteran tree (T316).</p>	<p>Although corridor 4 would impact different receptors than corridor 1, the effects would not be significant, and are therefore as described for corridor 1.</p>
Cultural heritage	<p>This corridor would cross or be very close to four non-designated archaeological sites: East of Oliver's Farm, cropmarks 1 (Asset 277); Culvert on the Witham to Maldon dismantled railway line 7 (Asset 292); the Witham to Maldon railway line (dismantled) (Asset 345); Cropmarks S of Little Braxted (Asset 349).</p> <p>This corridor would be close to two Grade II listed buildings: Benton Hall (Asset 324) and Barn at Ishams Chase (Asset 344).</p>	<p>Construction within this corridor would potentially remove archaeological remains associated with Assets 277 and 349, both assessed to be of negligible value. Trial trenching is to be conducted at Asset 277 and its value may be revised once the results are known.</p> <p>It is possible that significant effects could occur to Assets 277 and 349. It is unlikely that significant effects would occur to Assets 292 and 345.</p> <p>Mitigation for the potential impacts on Assets 277 and 349 would most likely consist of detailed archaeological excavation of the affected part of each site depending on the results of the trial trenching. Mitigation for the potential impact on Asset 345 and Asset 292 would consist of an archaeological watching brief during construction.</p>

Aspect	Key constraints and impacts	Assessment of effects
		<p>Construction within this corridor in close proximity to the listed buildings would result in impacts on their setting from noise and visual intrusion associated with construction. Such impacts would be temporary and of short-term duration and are considered unlikely to be significant.</p> <p>Impacts on the setting of Assets 324 and 344 during construction would be mitigated through the use of best practice measures in line with the British Standards Institute Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (BS 5228; 2008) to minimise noise during construction.</p>
Landscape and visual	<p>Key landscape constraints: Local landscape character area A9 Blackwater River Valley and Landscape Sub Area A9A which incorporate the Blackwater Rail Trail Country Park, parts of the River Blackwater and the River Brain, existing trees and vegetation including distinctive plantations within Blackwater Valley, and a potential veteran tree east of the A12 (T316).</p> <p>Key potential visual receptors: Users of the Blackwater Rail Trail Country Park, Whetmead LNR, Benton Hall Golf and Country Club and PRow. Residents within properties south and east of the A12 on the edge of Witham and residents along Ishams Chase (including Barn at Ishams Chase which is listed).</p>	<p>Potential for significant effects on local landscape character and visual receptors (including within listed building) during construction due to vegetation loss, including close to the A12 which would exacerbate the prominence of highway infrastructure, and the presence of construction activity, although this would be partly in the context of the existing A12.</p> <p>Potential for significant effects on local landscape character and visual receptors during operation due to vegetation loss and potential limitations on replanting trees within the HPP easement. This option potentially creates an open corridor with views across the Blackwater Valley from Ishams Chase towards the A12.</p>
Biodiversity	The key constraints for this corridor are the same as corridor 2.	The effects from this corridor are as described for corridor 2.
Geology and soils	The key constraints for this corridor are the same as corridor 2.	The effects from this corridor are as described for corridor 2.
Materials assets and waste	The key constraints for this corridor are the same as corridor 2.	The effects from this corridor are as described for corridor 2.



Aspect	Key constraints and impacts	Assessment of effects
Noise and vibration	The key constraints for this corridor are the same as corridor 2, however, less residential receptors along Ishams Chase would be impacted.	The effects from this corridor are as described for corridor 2.
Population and health	<p>The following receptors have been identified:</p> <ul style="list-style-type: none"> <li>• Three arable agricultural landholdings and an area of plantation woodland belonging to a fourth holding. Up to five potential additional areas of grazing or plantation woodland have been identified, belonging to a maximum of five further landowners, however it is currently unknown whether their use is commercial or domestic.</li> <li>• Benton Hall Golf Course and Country Club.</li> <li>• Three PRow, Blue Mills Hill and Ishams Chase.</li> <li>• Four residential properties located on the east side of Blue Mills Hill, and one property on the south side of Ishams Chase.</li> </ul>	<p>The effect on agricultural land is as described for corridor 1.</p> <p>The effect on Benton Hall Golf Club and Country Club is as described for corridor 1.</p> <p>Temporary disruption to access and amenity of three PRow, Blue Mills Hill and Ishams Chase. The magnitude of impact on these receptors would be negligible adverse to minor adverse during construction, and the overall significance of effect on WCH and community assets would remain slight adverse during construction and neutral to slight beneficial (on WCH) or slight adverse to neutral (on community assets) during operation.</p> <p><i>Note: An assumption has been made that the final routing would avoid direct impacts on the residential properties on Maldon Road and Ishams Chase and built infrastructure which forms part of Benton Hall Golf Club and Country Club (including proposals under planning application ref: 19/01980/FUL, Braintree District Council).</i></p>
Road drainage and the water environment	Key constraints and impacts are as described for corridor 2, however, corridor 4 would only cross three unnamed watercourses.	The effects from this corridor are as described for corridor 2.
Climate	Key constraints and impacts are similar across all corridors and therefore are as described for corridor 1.	Effects are similar across all corridors and therefore are as described for corridor 1.

**Table A.5 Preliminary assessment of effects for diversion corridor 5**

Aspect	Key constraints and impacts	Assessment of effects
<b>Corridor 5</b>		
Air quality	<p>The key constraints for this corridor are the same as corridor 2, with the following differences:</p> <ul style="list-style-type: none"> <li>Corridor 5 is within 200m of one additional residential property located off of Blue Mills Hill.</li> <li>Corridor 5 is also located within 200m of the Chantrey/Mope Woods ancient woodland and LWS.</li> </ul>	Although corridor 5 would impact different receptors than corridor 1, the effects would not be significant, and are therefore as described for corridor 1.
Cultural heritage	The key constraints for this corridor are the same as corridor 2.	The effects from this corridor are as described for corridor 2.
Landscape and visual	The key constraints for this corridor are the same as corridor 2.	The effects from this corridor are as described for corridor 2.
Biodiversity	<p>The key constraints for this corridor are the same as corridor 2, with the following differences:</p> <ul style="list-style-type: none"> <li>Additional areas of broadleaved woodland to the east of the River Blackwater could be impacted by corridor 5.</li> <li>Corridor 5 is located within 200m of the Chantrey/Mope Woods ancient woodland and LWS, which could be impacted by air quality.</li> </ul>	The effects from this corridor are as described for corridor 2. The additional impact on Chantrey/Mope Woods ancient woodland and LWS from dust-emitting construction activities would not be significant with the implementation of suitable mitigation measures, to be outlined in the first iteration of the EMP.
Geology and soils	The key constraints for this corridor are the same as corridor 2.	The effects from this corridor are as described for corridor 2.
Material assets and waste	The key constraints for this corridor are the same as corridor 2.	The effects from this corridor are as described for corridor 2.

Aspect	Key constraints and impacts	Assessment of effects
Noise and vibration	Residential receptors on the western side of Maldon Road, Blue Mills Hill, and along Ishams Chase.	There would be a temporary increase in noise at the rear of some houses to the west of Maldon Road, on the front of two houses along Blue Mills Hill, and on the rear of the few houses along Ishams Chase. The increase in noise is unlikely to be significant due to the nature of the work and the relatively short duration that the works would be in any single location.
Population and health	<p>The following key receptors have been identified:</p> <ul style="list-style-type: none"> <li>• Two arable agricultural landholdings and an area of plantation woodland belonging to a third holding. Up to nine potential additional areas of grazing, arable or plantation woodland have been identified, belonging to a maximum of eight further landowners, however it is currently unknown whether their use is commercial or domestic.</li> <li>• Benton Hall Golf Course and Country Club.</li> <li>• Blackwater Rail Trail Country Park and cycle route.</li> <li>• Six PRoW, Blue Mills Hill, Ishams Chase and Maldon Road.</li> <li>• One residential property located north of Blue Mills Hill.</li> </ul>	<p>The effect on agricultural land is as described for corridor 1.</p> <p>The effect on Benton Hall Golf Club and Country Club is as described for corridor 1.</p> <p>Temporary disruption to access and amenity of the Blackwater Rail Trail cycle route and country park, as well as six PRoW, Blue Mills Hill, Ishams Chase and Maldon Road. The magnitude of impact on these receptors would be negligible adverse or minor adverse during construction, and the overall significance of effect on WCH and community assets would be slight adverse during construction and slight adverse to neutral during operation.</p> <p>No changes to the previously assessed outcomes for health determinants is anticipated.</p> <p><i>Note: An assumption has been made that the final routing would avoid direct impacts on the residential property on Blue Mills Hill and built infrastructure which forms part of Benton Hall Golf Club and Country Club (including proposals under planning application ref: 19/01980/FUL, Braintree District Council).</i></p>
Road drainage and the water environment	The key constraints for this corridor are the same as corridor 2, however, corridor 5 would avoid the spring located at Ishams Barn.	Effects for corridor 5 are similar to corridor 2, however, there would be no effect on the spring located at Ishams Barn.
Climate	Key constraints and impacts are similar across all corridors and therefore are as described for corridor 1.	Effects are similar across all corridors and therefore are as described for corridor 1.

## A.5 Conclusions

- A.5.1 All of the corridors would result in adverse effects as a result of the construction works required for the HPP diversion. By following construction best practice and implementing standard mitigation measures, most of the adverse effects would not be significant. However, there is potential for significant effects on non-designated archaeological remains (Assets 277, 333, and 349), landscape and views, woodland habitat, Whetmead LNR and LWS, and groundwater. A summary of the key effects for each aspect is provided below, and Table A.6 summarises the potential significant effects from the diversion options.
- A.5.2 Construction within all of the corridors would generate dust which could impact sensitive features such as LWS and LNRs and potential veteran trees within 200m of the works. With the implementation of suitable mitigation measures, to be outlined in the first iteration of the EMP, air quality impacts for all corridors are not considered to be significant. Mitigation measures would include the dampening down of surfaces, planning the site layout so that machinery and dust-causing activities occur as far from receptors as practicable, erecting screens or barriers around the dust-causing activities or the site boundary and the minimising, covering or dampening down of stockpiles to prevent entrainment by wind.
- A.5.3 Further trial trenching is required to determine the impacts on some of the archaeological remains within each of the corridors. All corridors have the potential for significant effects on cropmarks east of Oliver's Farm (Asset 277). Corridors 2, 4 and 5 have the potential for significant effects on cropmarks south of Little Braxted (Asset 349). Corridors 2 and 5 also have the potential for significant effects on the site of Machin's Mill or Blue Mills (Asset 333). It is likely through mitigation measures such as archaeological excavations and watching briefs during construction works, impacts could be minimised so as not to be significant. Areas with a lack of previous investigation may require non-invasive geophysical surveys followed by trial trenching, the results of which would be used to inform the need for, and design of, any mitigation which may be necessary.
- A.5.4 Vegetation loss as a result of construction for all corridors has the potential for significant effects on local landscape character and visual receptors. This is also likely to cause significant effects during operation due to easements restrictions limiting replanting of trees above the HPP.
- A.5.5 All of the corridors would result in the loss of woodland habitats which are more difficult to mitigate due to the time required for habitats to mature. Therefore, there would be a moderate adverse impact (significant effect) from all diversion options. Those corridors with the least impact on woodland habitat (i.e. those requiring the smallest area of woodland clearance) would have the least impact on biodiversity.
- A.5.6 Other habitat losses are more easily mitigated, and given the temporary nature of the impacts, are considered not significant.

- A.5.7 Corridors 1 and 3 result in direct impacts to Whetmead LNR and LWS and terrestrial invertebrates the site supports. However, impacts would be temporary and with the reinstatement of habitats it is anticipated impacts would not be significant, depending on the effects on groundwater. Following ground investigation works within the potential corridors, it will be possible to more accurately assess impacts to groundwater. In the interim, a precautionary approach has been adopted and impacts to Whetmead LNR and LWS are assumed to be moderate adverse (significant effect).
- A.5.8 Further protected species surveys are required to determine the presence or likely absence of protected and notable species, in particular bat roosts, badger setts, barn owl roosts and potentially dormice, within habitats not surveyed as part of the proposed scheme. Due to the width of the corridors and flexibility to adjust the alignment of the construction area within the corridors, it is anticipated that even if roosts and setts are present, it may be possible to avoid impacts. However, should this not be possible, standard mitigation techniques would be applied to offset impacts to these features and dormouse habitat (if present), under a mitigation licence where required.
- A.5.9 The historic landfill at Whetmead is the main geology and soils constraint on corridors 1 and 3. However, there are no likely significant effects from any of the corridors. Ground investigation is ongoing to determine the contamination levels, and therefore the cost and safety implications, of diverting the HPP through the landfill.
- A.5.10 None of diversion corridors are likely to generate significant environmental effects for the material assets and waste aspect. The design of the HPP diversion would seek to minimise the consumption of materials, unnecessary sterilisation of mineral resources, and the generation of waste throughout the lifecycle of the HPP diversion in line with the mitigation measures for the wider proposed scheme.
- A.5.11 Noise and vibration impacts for all corridors are unlikely to be significant due to the nature of the construction work and the relatively short duration that the works would be in any single location.
- A.5.12 The effects of temporary land acquisition and disruption on residential properties, businesses, amenities and PRow are not expected to be significant during construction or operation of any of the diversion options. Permanent easement rights would be required and there may be limitations on replanting of trees and hardwood plants within the area subject to easement.
- A.5.13 From a water quality perspective, the corridors which cross over the least number of watercourses would have the least impact. As such, corridor 3 would have the least impact on water quality as it only crosses two watercourses. Corridors 2 and 5 would be likely to have the greatest impact on water quality as they cross eight individual watercourses, including the River Blackwater and ordinary watercourse 32 twice. However, there are no likely significant effects on water quality from any of the corridors.
- A.5.14 There are also no likely significant hydromorphological or flood risk effects from any of the corridors.

- 
- A.5.15 All the corridors have the potential to generate moderate adverse effects on groundwater receptors, subject to the ongoing groundwater assessment which will feed into the Environmental Statement. All corridors, with the exception of corridor 3, are located directly upgradient of two licenced groundwater abstractions which could be impacted during construction and require mitigation. Corridors 1 and 3 cut through a historic landfill, with the resultant potential for the works to create a pathway for leachates into the secondary A aquifer which underlies the area. At the time of writing, ground investigation has not been completed within the landfill and therefore groundwater levels in the area are currently unknown.
- A.5.16 The increase in GHG emissions associated with each diversion option is unlikely to be significant. Shorter options (corridors 1 and 3), which result in the consumption of fewer raw materials, reduced construction activities and less disturbance of soil and vegetation, would likely result in fewer GHG emissions, and on this basis would have the least impact on climate change.
- A.5.17 Given the potential for significant environmental effects for all diversion corridors, it is possible that the HPP diversion works meet the threshold set out in the Planning Act 2008 and would therefore be classed as an NSIP (based on the criteria set out in Section A.1 of this appendix). As such, the Environmental Statement and DCO application for the proposed scheme will have regard to the relevant National Policy Statement for Energy, as well as the National Networks National Policy Statement.

**Table A.6 Summary of potential significant effects from the HPP diversion**

Aspect	Diversion option				
	Corridor 1	Corridor 2	Corridor 3	Corridor 4	Corridor 5
Air quality	No significant effects identified.				
Cultural heritage	Possible significant effect to non-designated archaeological remains associated with Asset 277.	Possible significant effect to non-designated archaeological remains associated with Assets 277, 349, and 333.	Possible significant effect to non-designated archaeological remains associated with Asset 277.	Possible significant effect to non-designated archaeological remains associated with Assets 277 and 349.	Possible significant effect to non-designated archaeological remains associated with Assets 277, 349, and 333.
Landscape and visual	Potential for significant effects on local landscape character and visual receptors due to vegetation loss.				
Biodiversity	Potential for significant effects on woodland habitat and GWDTE within Whetmead LNR and LWS.	Potential for significant effects on woodland habitat.	Potential for significant effects on woodland habitat and GWDTE within Whetmead LNR and LWS.	Potential for significant effects on woodland habitat.	Potential for significant effects on woodland habitat.
Geology and soils	No significant effects identified.				
Material assets and waste	No significant effects identified.				
Noise and vibration	No significant effects identified.				
Population and health	No significant effects identified.				

Aspect	Diversion option				
	Corridor 1	Corridor 2	Corridor 3	Corridor 4	Corridor 5
Road drainage and the water environment	Potential significant effects on groundwater and GWDTE within Whetmead LNR and LWS.	Potential significant effects on groundwater.	Potential significant effects on groundwater and GWDTE within Whetmead LNR and LWS.	Potential significant effects on groundwater.	Potential significant effects on groundwater.
Climate	No significant effects identified.				
Cumulative effects assessment	Cumulative effects will be assessed and reported within the Environmental Statement.				



## Acronyms

Abbreviation	Term
ALC	Agricultural Land Classification
barg	bar gauge (gauge pressure)
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GHG	Greenhouse Gases
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HGV	Heavy Goods Vehicle
HPP	High Pressure Pipeline
LNR	Local Natural Reserve
LWS	Local Wildlife Site
NGR	National Grid Reference
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report
PRoW	Public Right of Way
TPO	Tree Preservation Order
WCH	Walkers, Cyclists and Horse-riders
WER	Water Environment Regulations

## Glossary

Term	Definition
Air quality objective (AQO)	The threshold below which harmful effects from pollutant exposure are not expected, set out within the Air Quality Standards Regulations 2010.
Above Ground Installation	A site where gas is filtered and heated, prior to it being reduced in pressure and circulated through the distribution network.
Agricultural Land Classification (ALC)	The Agricultural Land Classification system forms part of the planning system in England and Wales. It classifies agricultural land in five categories according to versatility and suitability for growing crops.
Archaeological geophysical survey	Survey using non-intrusive and non-destructive techniques to determine the presence or absence of anomalies likely to be caused by archaeological features, structures or deposits. Geophysical survey determines the presence of anomalies of archaeological potential through measurement of one or more physical properties of the subsurface.
Archaeological watching brief	A formal programme of archaeological observation and investigation conducted during any operation carried out for non-archaeological reasons.
Aspect	This refers to an environmental topic (e.g. air quality, biodiversity, noise).
barg	A unit of gauge pressure.
Barn owl nest	A site used by barn owls for nesting and raising of young, legally protected when in use for nesting.
Barn owl roost	A site used by a barn owl to roost/rest but not nest.
Baseline	In EIA, 'baseline conditions' are the environmental conditions in existence before the occurrence of an impact from a development, i.e. they are the existing conditions that would be affected.
Baseline (in context of landscape and visual)	Work to provide an outline understanding of landscape and visual conditions before or without implementation of the project, requiring a mix of desk study consultation and field work.
Bat roost	A bat's home.
Carbon budgets	A carbon budget, defined in accordance with the Climate Change Act 2008, places a restriction on the total amount of greenhouse gases the UK can emit over a defined five-year period.
Carbon emissions	Shorthand for emissions of any of the seven GHGs that contribute to climate change.
Climate	Long-term weather conditions prevailing over a region.

Term	Definition
Cumulative effects	Effects upon the environment that result from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions. Each impact by itself may not be significant but can become a significant effect when combined with other impacts.
Design Manual for Roads and Bridges (DMRB)	Provides standards, advice notes and other documents relating to the design, assessment and operation of trunk roads, including motorways in the United Kingdom.
Development Consent Order (DCO)	Introduced by the Planning Act in 2008, a DCO is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP).
Dewatering	Dewatering refers to the removal of groundwater and/or surface water from a location to facilitate construction.
Easement	A right to use and/or enter onto the land or property of another without possessing it (e.g. for maintaining infrastructure).
Effect	Term used to express the consequence of an impact. The significance of effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making. For certain projects, EIA is a statutory requirement.
Environmental Management Plan (EMP)	A site-specific plan (or set of plans) developed to ensure that appropriate environmental management practices are followed during the construction and operation phases of a scheme. An initial EMP will be included in the DCO application. This will then be updated before construction starts, and again after completion of works before the scheme becomes operational.
Environmental Statement	A document produced in accordance with the EIA Directive, as transposed into UK law by the EIA Regulations, to report the results of an EIA.
Floodplain	A floodplain is flat or nearly flat land adjacent to a stream or river, stretching from the banks of its channel to the base of the enclosing valley walls and (under natural conditions) experiences periods of flooding.
Flood risk	The exposure, vulnerability and hazard associated with flooding.
Greenhouse gases (GHG)	A gaseous compound that absorbs infrared radiation and traps heat in the atmosphere. Greenhouse gases are usually expressed in terms of carbon dioxide equivalent (CO <sub>2e</sub> ).
Groundwater dependent terrestrial ecosystem (GWDTE)	Groundwater dependent terrestrial ecosystems are wetlands which critically depend on groundwater flows and chemistries.

Term	Definition
Heritage assets	The historic environment assets such as archaeological remains, historic buildings and historic landscapes which have archaeological, architectural, artistic or historic value.
Landscape character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Listed building	A building or structure designated under Section 1 of the Planning (Listed Building and Conservation Areas) Act 1990 as being of special architectural or historic interest.
Local Nature Reserve (LNR)	Sites that are designated by the local authority under Section 21 of the National Parks and Access to the Countryside Act 1949 for nature conservation, which have wildlife or geological features that are of special interest locally.
Local Wildlife Sites (LWS)	Local Wildlife Sites are non-statutory designated sites that have been identified and selected for their 'substantive nature conservation value'.
Magnitude	The scale, size or degree of change (impact) to the environment from an action upon it.
Main river	A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers. A main river designation is not an indication of size, although it is often the case that they are larger than ordinary watercourses.
Main sett	A badger's home, usually consisting of a network of tunnels with multiple entrances.
Mitigation	The action of reducing the severity and magnitude of change (impact) to the environment. Measures to avoid, reduce, remedy or compensate for significant adverse effects.
Nationally Significant Infrastructure Project (NSIP)	Major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, and major road projects, as set out in the Planning Act 2008. See entry for Development Consent Order.
Order Limits	The spatial boundaries of the proposed scheme. At this stage, the Order Limits are provisional as they have not been finalised.
Ordinary watercourse	All watercourses that are not designated as main rivers, and which are the responsibility of local authorities or, where they exist, Internal Drainage Boards. Note that being designated as an ordinary watercourse does not imply a 'small' river, although it is often the case that ordinary watercourses are smaller than main rivers.
Piling	A deep foundation installed to support a structure.

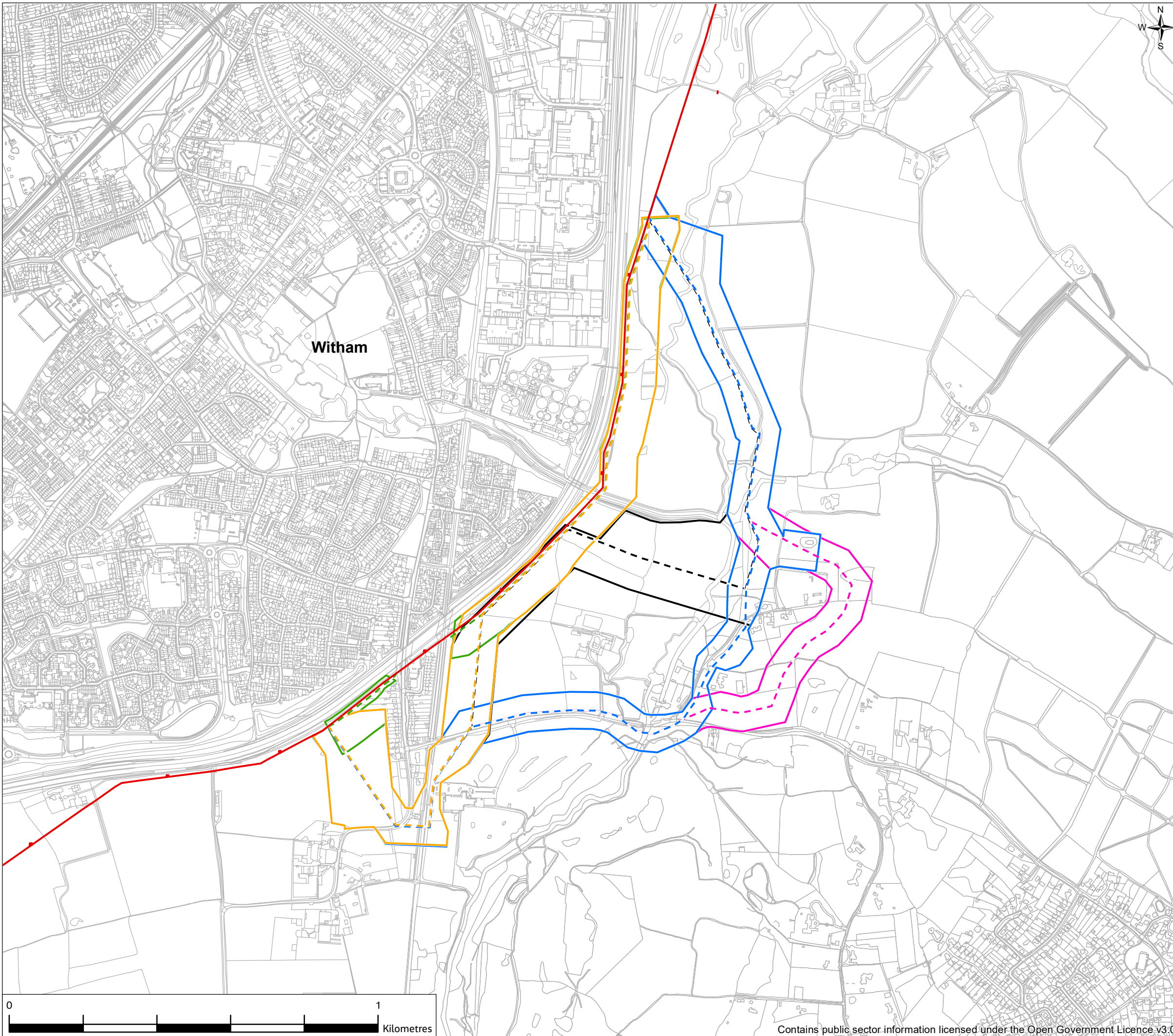
Term	Definition
Preliminary Environmental Information Report (PEIR)	Report produced for statutory consultation for schemes consented through the Planning Act 2008. The purpose of the PEIR is to provide environmental information to enable consultees to understand the likely significant environmental effects of the proposed scheme, and measures proposed to mitigate such effects, to help inform their consultation responses.
Pressure Reduction Station	Required to regulate the high incoming pipeline pressure to meet the desired equipment pressure.
Priority habitat	Priority habitats are the habitats of conservation priority which are listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
Protected and notable species	Species of plant and animal protected by legislation, and species of conservation importance such as priority species or species of principal importance.
Public right of way (PRoW)	A widely known right to cross private land is known as a 'right of way'. If this is a right granted to everyone it is a 'public right of way'.
Receptor	The 'receptor' is the existing environmental feature usually associated with population, fauna or flora that would be affected by an impact of a development – for instance, the population of a protected species, or a specific archaeological site, or the occupants of a residential property.
Secondary A aquifer	Deposits that comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers or wetland ecosystems.
Significance	A measure of the importance, or gravity, of the environmental effect, defined by significance criteria specific to the environmental aspect.
Source Protection Zone (SPZ)	Zones around groundwater sources used for potable supply or food processing, including wells, boreholes and springs, which show the level of risk to the source from contamination.
Species of principal importance	Species of principal importance are species protected under section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
Standard mitigation	Mitigation required regardless of the EIA because it is generally imposed through legislative requirements or standard sector practices (e.g. implementing considerate contractor practices to reduce nuisance from site work). These measures would be captured in an Environmental Management Plan (EMP).
Statutory consultation	A period to seek comments from the local community and statutory consultees on the proposed scheme.

Term	Definition
Stoppie Pit	<p>Stoppie is a procedure used when diverting or repairing a damaged pipeline. Stoppie allows the isolation of a section of pipeline in the absence of a shutoff valve. After welding a flanged saddle to the pipe, the line is then 'hot tapped'— this is a method of making a connection to an existing high pressure pipe without the interruption or depressurisation of that section of pipe. An expanding resilient plug is inserted into the pipe bore. When the bypass or diverted pipework has been completed, the plug is withdrawn and a valve, installed on the saddle flange. This facilitates the bypass and can now be pressurised. The existing pipe can now isolated, decommissioned and either grouted or removed.</p>
Targeted consultation	<p>A period to seek comments from the local community and statutory consultees on design changes that have occurred after the statutory consultation.</p>
Tree Preservation Order (TPO)	<p>A Tree Preservation Order is an order made by a local planning authority in England to protect specific trees, groups of trees or woodlands in the interests of amenity.</p>
Trenchless crossing	<p>A subsurface construction method that allows the installation of pipes below the ground with minimal excavation.</p>
Trial trenching	<p>The excavation of a pattern of linear trenches to determine the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts and their research potential, within a specified area. If such archaeological remains are present, trial trenching aims to define their character, extent, quality and state of preservation, reports on them and enables an assessment of their significance in a local, regional, national or international context as appropriate.</p> <p>Trial trenching may be conducted 'blind' or to test the results of non-intrusive investigations like geophysical surveys.</p>
Veteran tree	<p>A tree that by recognised criteria shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned.</p>
Visual receptors	<p>Individuals and/or defined groups of people who have the potential to be affected by a proposal.</p>

Term	Definition
Walkers, cyclists and horse riders (WCH)	<p>Users that include:</p> <ul style="list-style-type: none"> <li>• pedestrians – including mobility impaired and vulnerable pedestrians</li> <li>• cyclists – including mobility impaired and vulnerable cyclists</li> <li>• equestrians – including mobility impaired and vulnerable equestrians</li> </ul> <p>Other users considered as part of this group include (but are not limited to):</p> <ul style="list-style-type: none"> <li>• scooter riders (non-motorised)</li> <li>• cyclists with electrically assisted pedal cycles (where these conform to Department for Transport or other relevant regional regulations and where they can legally be used)</li> <li>• users of powered wheelchairs (where these conform to Department for Transport regulations and where they can legally be used)</li> </ul>
Waste	<p>Defined in line with Article 3(1) of the Waste Framework Directive (Council Directive 2008/98/EC) as: ‘any substance or object which the holder discards or intends or is required to discard’. Waste is commonly split into the following classifications: inert, hazardous, and non-hazardous (the latter being waste classified as neither inert nor hazardous).</p>

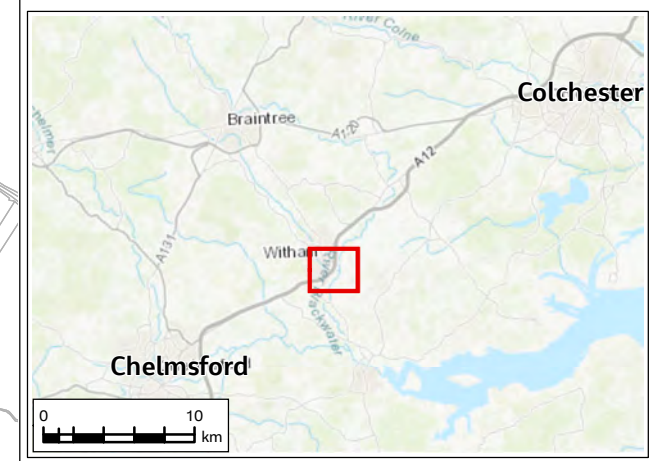
## Figure 1 Existing and proposed gas mains diversion





**FIGURE 1**

- Legend**
- Existing High Pressure Pipeline (HPP)
  - - - Gas Pipeline Diversion Option 1
  - Gas Pipeline Diversion Option 1 Corridor
  - - - Gas Pipeline Diversion Option 2
  - Gas Pipeline Diversion Option 2 Corridor
  - - - Gas Pipeline Diversion Option 3
  - Gas Pipeline Diversion Option 3 Corridor
  - - - Gas Pipeline Diversion Option 4
  - Gas Pipeline Diversion Option 4 Corridor
  - - - Gas Pipeline Diversion Option 5
  - Gas Pipeline Diversion Option 5 Corridor



PO1	18/10/21	For consultation	AD	TL	SM	SG
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Contractor			Designer			
			 Cottons Centre, Cottons Lane, London, SE1 2QG, UK. Tel: +44 (0)20 3980 2000 www.jacobs.com			
Client						
Project						
A12 CHELMSFORD TO A120 WIDENING SCHEME						
Drawing Title						
CADENT GAS PIPELINE DIVERSION EXISTING AND PROPOSED GAS MAINS DIVERSION						
Drawing Status						
S3 - SUITABLE FOR REVIEW AND COMMENT						
Scale @ A3		1:10000			DO NOT SCALE	
Jacobs No.		B36601D1			Rev P01	
Client No.		HE551497				
Drawing Number						
HE551497-JAC-EGN-SCHW-SK-GI-0017						



© Copyright 2021 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party.

---

## Figure 2 Environmental constraints

Sheet 1 – Corridor 1

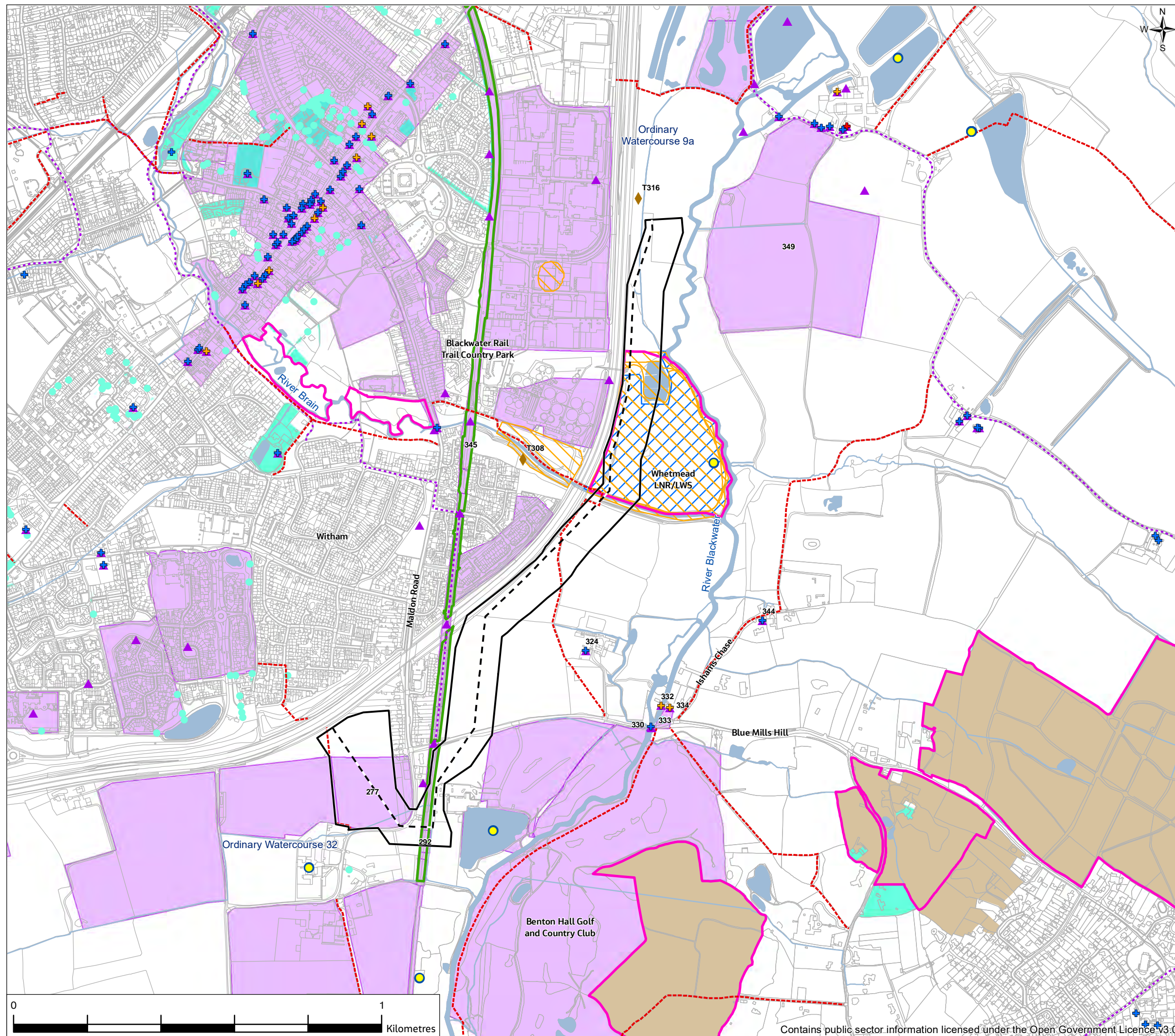
Sheet 2 – Corridor 2

Sheet 3 – Corridor 3

Sheet 4 – Corridor 4

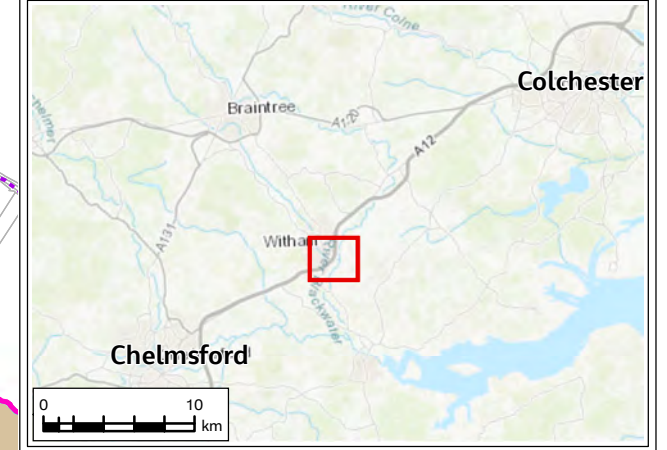
Sheet 5 – Corridor 5

**FIGURE 2**



- Legend**
- - Gas Pipeline Diversion Option 1
  - ▭ Gas Pipeline Diversion Option 1 Corridor
  - ⊕ Grade I Listed Building
  - ⊕ Grade II\* Listed Building
  - ⊕ Grade II Listed Building
  - Groundwater Abstraction License
  - ◆ T316 Potential Veteran Tree (with tree number)
  - ▲ 324 Cultural Heritage Asset (point - with site number)
  - 277 Cultural Heritage Asset (area - with site number)
  - - - Public Right of Way
  - - - National Cycle Route
  - Watercourse
  - Tree Preservation Order
  - Ancient Woodland
  - Historic Landfill
  - Country Park
  - Local Wildlife Site (LWS)
  - Local Nature Reserve (LNR)

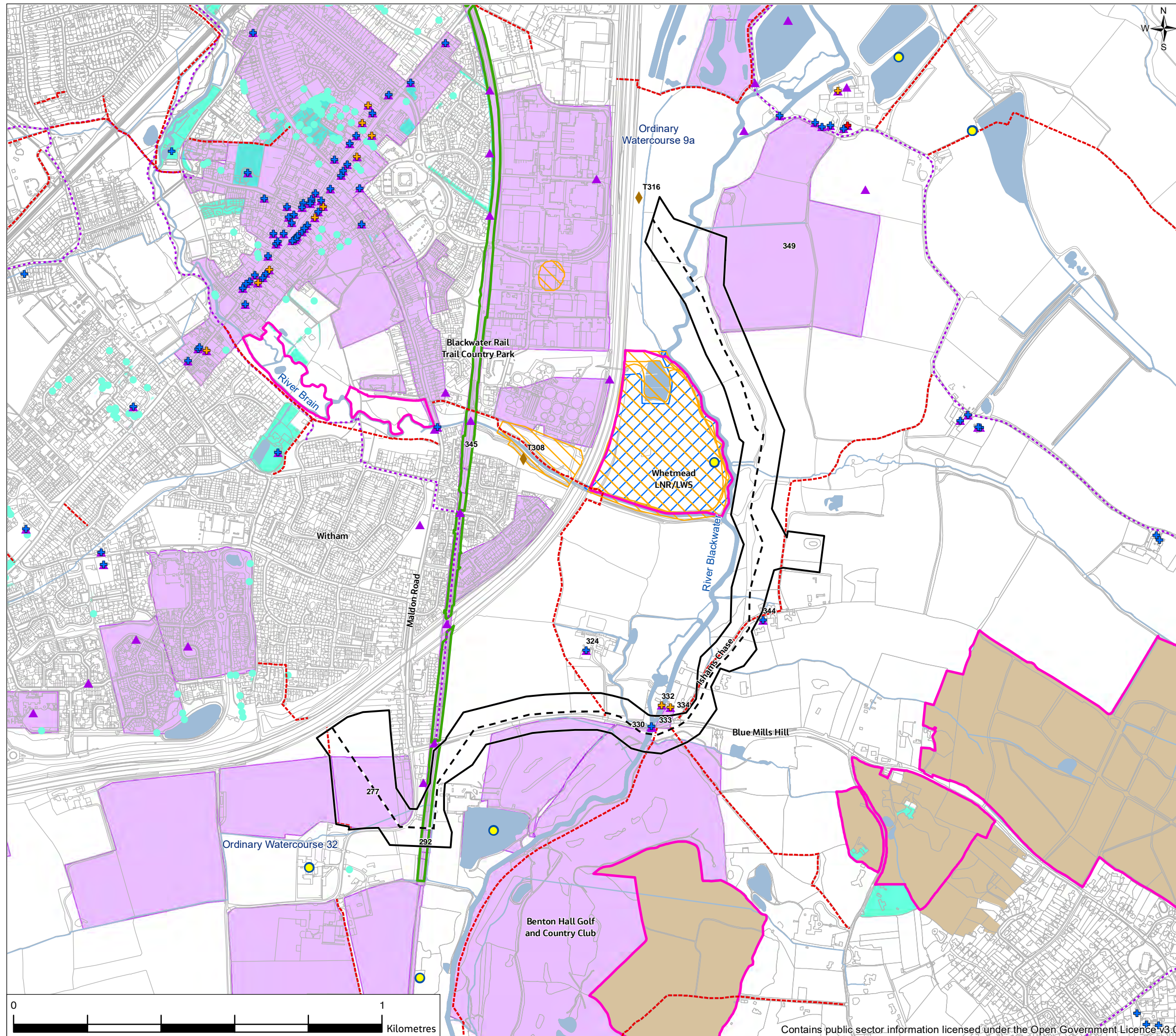
**Note:**  
The arboricultural survey is incomplete and therefore there may be other unidentified veteran trees within the study area.



PO1	18/10/21	For consultation	AD	TL	SM	SG
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Contractor			Designer			
			 Cottons Centre, Cottons Lane, London, SE1 2QG, UK. Tel: +44 (0)20 3980 2000 www.jacobs.com			
Client						
Project						
A12 CHELMSFORD TO A120 WIDENING SCHEME						
Drawing Title						
CADENT GAS PIPELINE DIVERSION OPTION 1 ENVIRONMENTAL CONSTRAINTS SHEET 1 OF 5						
Drawing Status						
S3 - SUITABLE FOR REVIEW AND COMMENT						
Scale @ A3		1:10000	DO NOT SCALE			
Jacobs No.		B36601D1			Rev P01	
Client No.		HE551497				
Drawing Number						
HE551497-JAC-EGN-SCHW-SK-GI-0018						



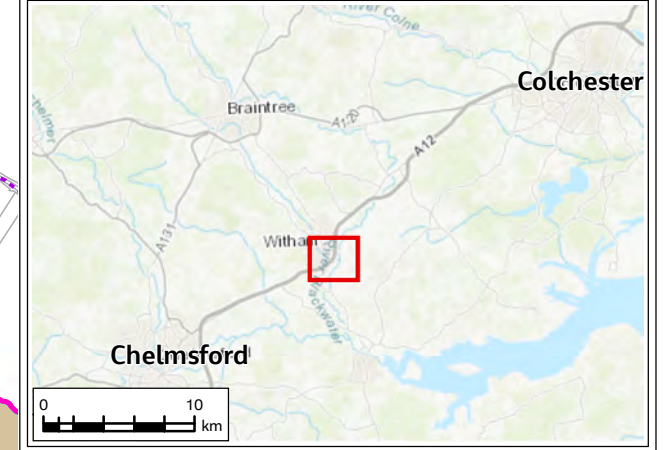
**FIGURE 2**



**Legend**

- - Gas Pipeline Diversion Option 2
- ▭ Gas Pipeline Diversion Option 2 Corridor
- ⊕ Grade I Listed Building
- ⊕ Grade II\* Listed Building
- ⊕ Grade II Listed Building
- Groundwater Abstraction License
- ◆ T316 Potential Veteran Tree (with tree number)
- ▲ 324 Cultural Heritage Asset (point - with site number)
- 277 Cultural Heritage Asset (area - with site number)
- - - - Public Right of Way
- - - - National Cycle Route
- Watercourse
- Tree Preservation Order
- Ancient Woodland
- Historic Landfill
- Country Park
- Local Wildlife Site (LWS)
- Local Nature Reserve (LNR)

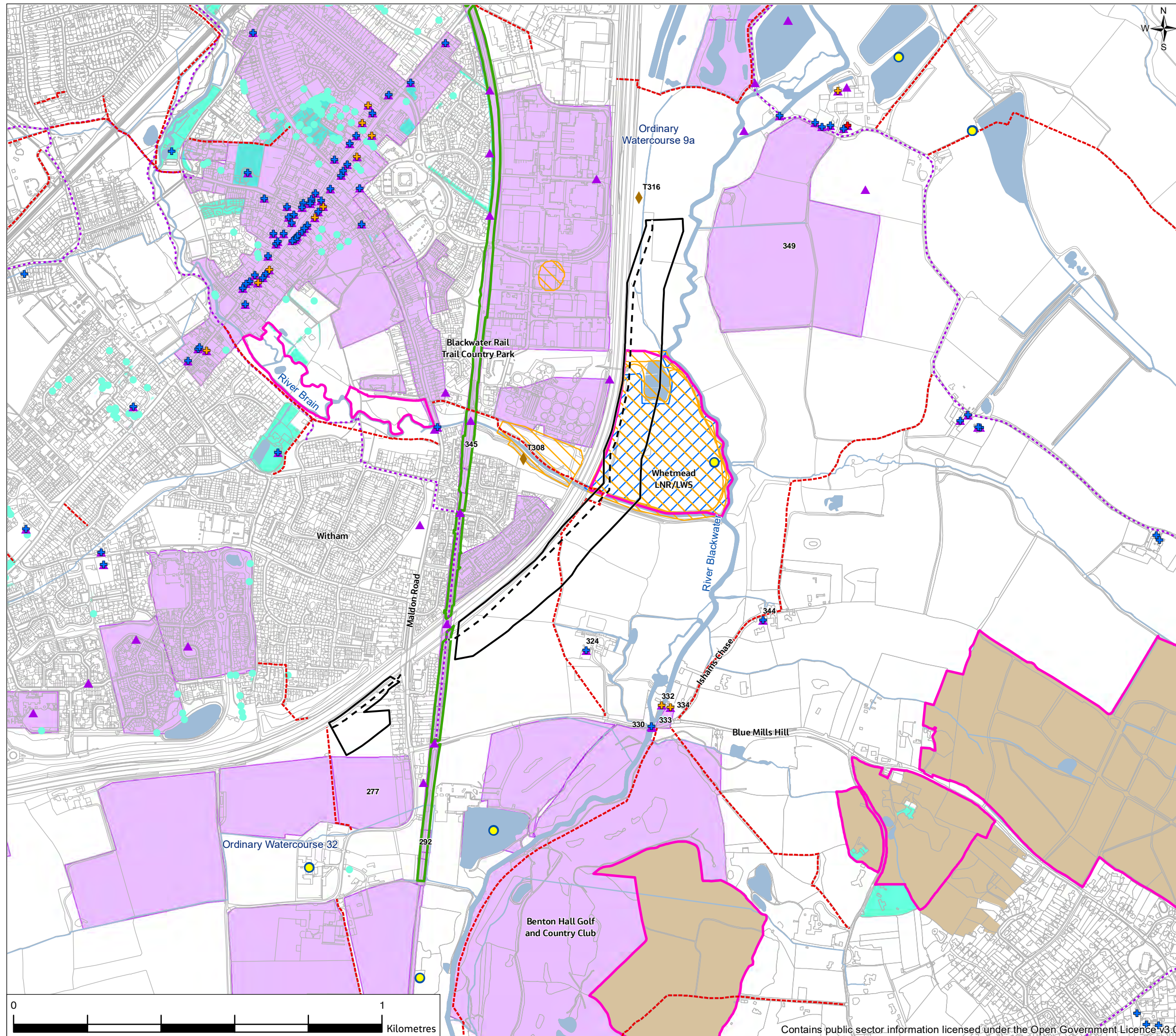
**Note:**  
The arboricultural survey is incomplete and therefore there may be other unidentified veteran trees within the study area.



PO1	18/10/21	For consultation	AD	TL	SM	SG
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Contractor			Designer			
			 Cottons Centre, Cottons Lane, London, SE1 2QG, UK. Tel: +44 (0)20 3980 2000 www.jacobs.com			
Client						
Project						
A12 CHELMSFORD TO A120 WIDENING SCHEME						
Drawing Title						
CADENT GAS PIPELINE DIVERSION OPTION 2 ENVIRONMENTAL CONSTRAINTS SHEET 2 OF 5						
Drawing Status						
S3 - SUITABLE FOR REVIEW AND COMMENT						
Scale @ A3		1:10000	DO NOT SCALE			
Jacobs No.		B36601D1	Rev		P01	
Client No.		HE551497	Drawing Number			
			HE551497-JAC-EGN-SCHW-SK-GI-0019			



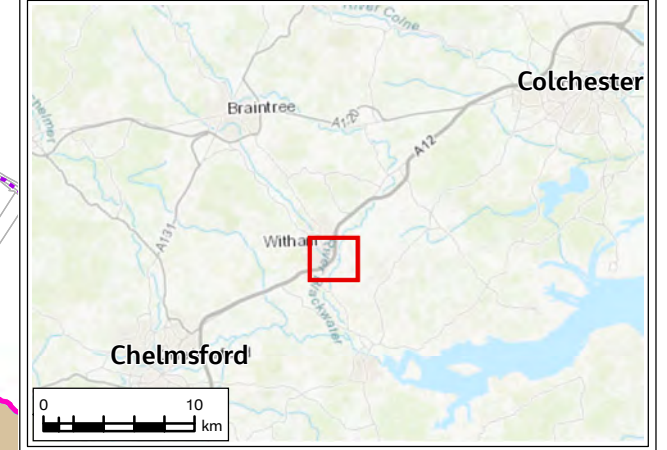
**FIGURE 2**



**Legend**

- - Gas Pipeline Diversion Option 3
- ▭ Gas Pipeline Diversion Option 3 Corridor
- ⊕ Grade I Listed Building
- ⊕ Grade II\* Listed Building
- ⊕ Grade II Listed Building
- Groundwater Abstraction License
- ◆ T316 Potential Veteran Tree (with tree number)
- ▲ 324 Cultural Heritage Asset (point - with site number)
- 277 Cultural Heritage Asset (area - with site number)
- - - Public Right of Way
- - - National Cycle Route
- Watercourse
- Tree Preservation Order
- Ancient Woodland
- Historic Landfill
- Country Park
- Local Wildlife Site (LWS)
- Local Nature Reserve (LNR)

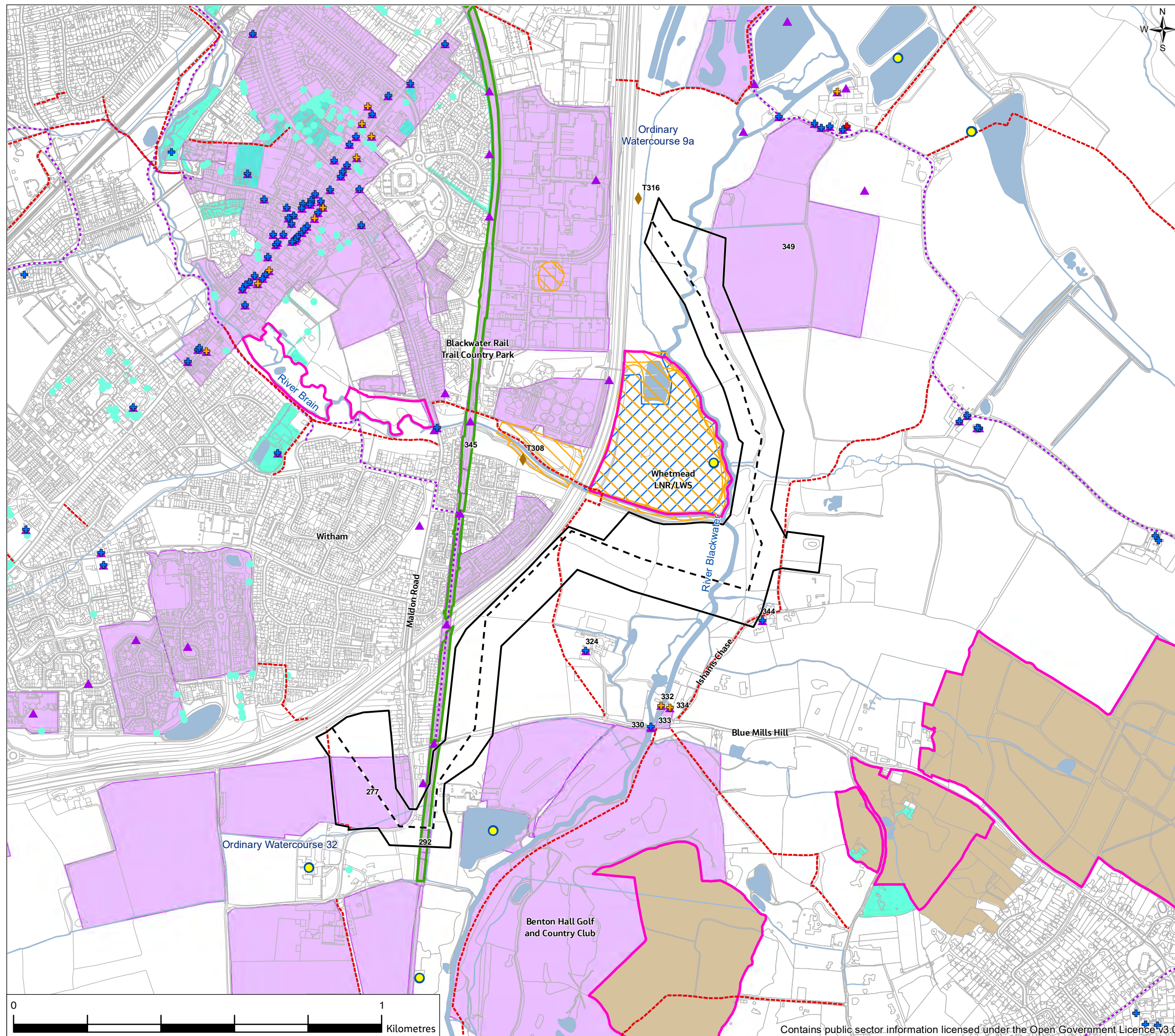
**Note:**  
The arboricultural survey is incomplete and therefore there may be other unidentified veteran trees within the study area.



PO1	18/10/21	For consultation	AD	TL	SM	SG
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Contractor			Designer			
			 Cottons Centre, Cottons Lane, London, SE1 2QG, UK. Tel: +44 (0)20 3980 2000 www.jacobs.com			
Client						
Project						
A12 CHELMSFORD TO A120 WIDENING SCHEME						
Drawing Title						
CADENT GAS PIPELINE DIVERSION OPTION 3 ENVIRONMENTAL CONSTRAINTS SHEET 3 OF 5						
Drawing Status						
S3 - SUITABLE FOR REVIEW AND COMMENT						
Scale @ A3		1:10000	DO NOT SCALE			
Jacobs No.		B36601D1	Rev		P01	
Client No.		HE551497				
Drawing Number						
HE551497-JAC-EGN-SCHW-SK-GI-0020						

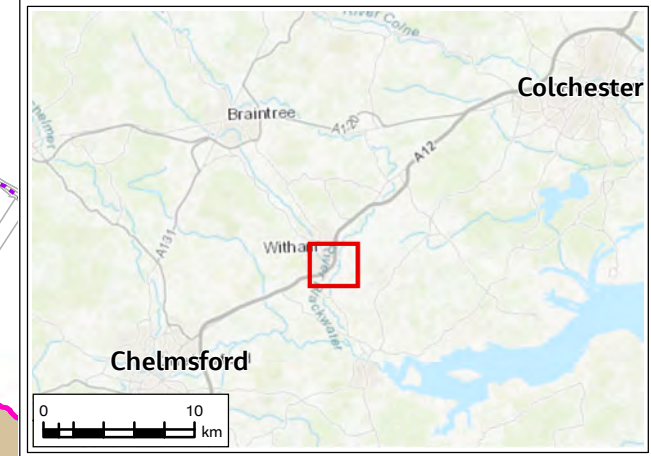


**FIGURE 2**



- Legend**
- - Gas Pipeline Diversion Option 4
  - ▭ Gas Pipeline Diversion Option 4 Corridor
  - ⊕ Grade I Listed Building
  - ⊕ Grade II\* Listed Building
  - ⊕ Grade II Listed Building
  - Groundwater Abstraction License
  - ◆ T316 Potential Veteran Tree (with tree number)
  - ▲ 324 Cultural Heritage Asset (point - with site number)
  - 277 Cultural Heritage Asset (area - with site number)
  - - - Public Right of Way
  - - - National Cycle Route
  - Watercourse
  - Tree Preservation Order
  - Ancient Woodland
  - Historic Landfill
  - Country Park
  - Local Wildlife Site (LWS)
  - Local Nature Reserve (LNR)

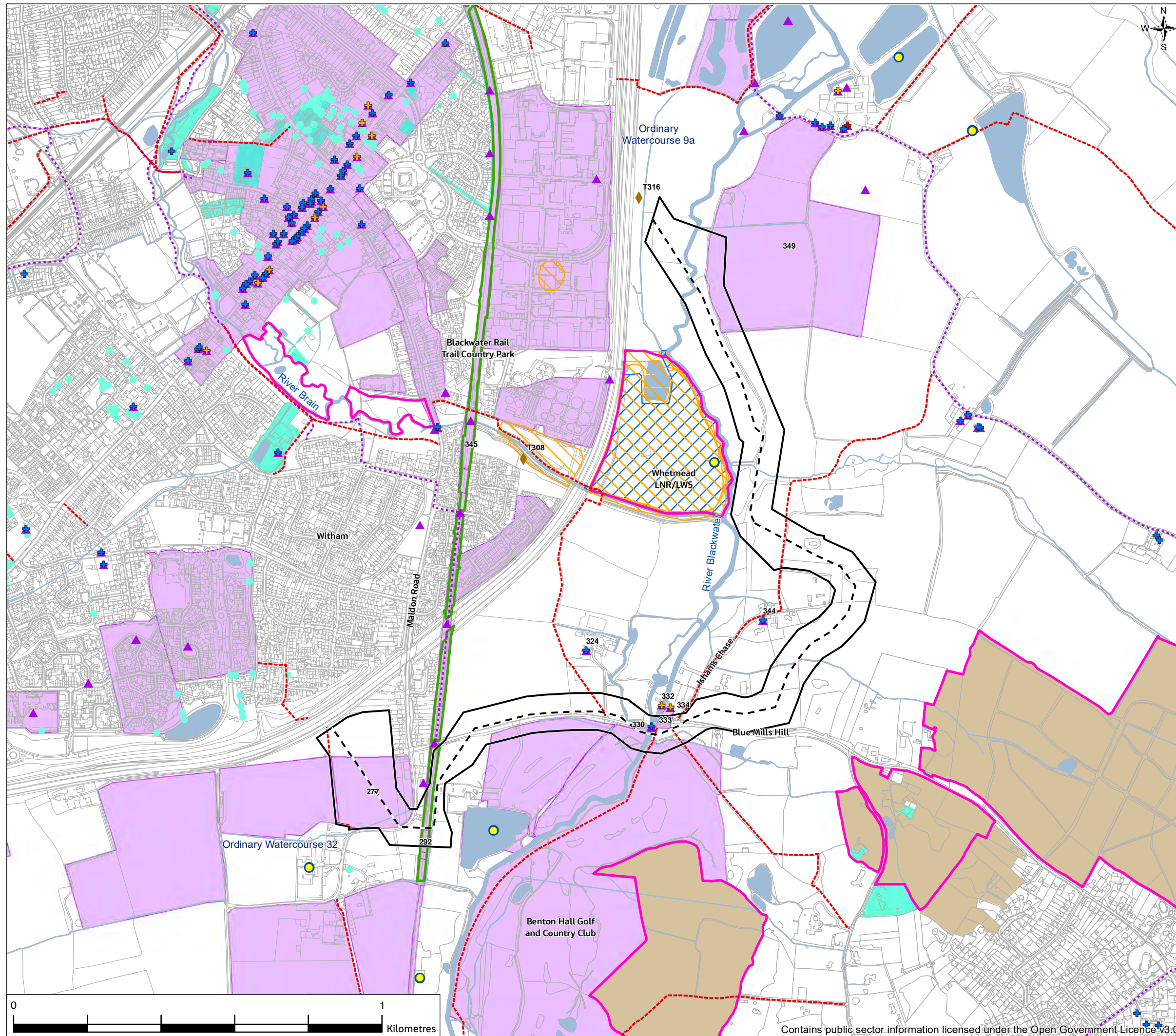
**Note:**  
The arboricultural survey is incomplete and therefore there may be other unidentified veteran trees within the study area.



PO1	18/10/21	For consultation	AD	TL	SM	SG
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Contractor			Designer			
			 Cottons Centre, Cottons Lane, London, SE1 2QG, UK. Tel: +44 (0)20 3980 2000 www.jacobs.com			
Client						
Project						
A12 CHELMSFORD TO A120 WIDENING SCHEME						
Drawing Title						
CADENT GAS PIPELINE DIVERSION OPTION 4 ENVIRONMENTAL CONSTRAINTS SHEET 4 OF 5						
Drawing Status						
S3 - SUITABLE FOR REVIEW AND COMMENT						
Scale @ A3		1:10000	DO NOT SCALE			
Jacobs No.		B36601D1	Rev P01			
Client No.		HE551497				
Drawing Number						
HE551497-JAC-EGN-SCHW-SK-GI-0021						

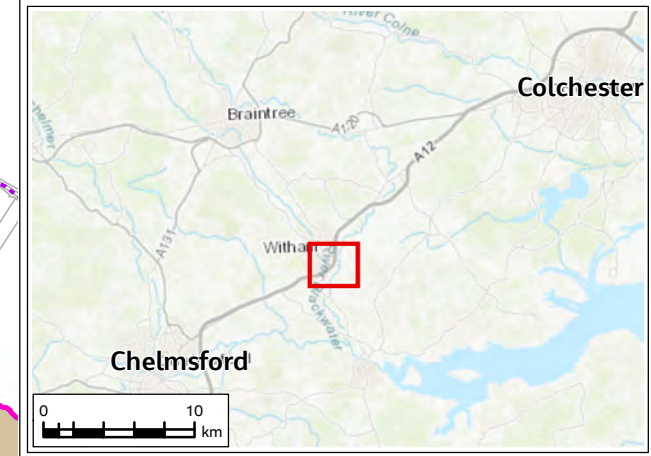
© Copyright 2021 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party.

**FIGURE 2**



- Legend**
- - Gas Pipeline Diversion Option 5
  - ▭ Gas Pipeline Diversion Option 5 Corridor
  - ⊕ Grade I Listed Building
  - ⊕ Grade II\* Listed Building
  - ⊕ Grade II Listed Building
  - Groundwater Abstraction License
  - ◆ T316 Potential Veteran Tree (with tree number)
  - ▲ 324 Cultural Heritage Asset (point - with site number)
  - 277 Cultural Heritage Asset (area - with site number)
  - - - - Public Right of Way
  - - - - National Cycle Route
  - Watercourse
  - Tree Preservation Order
  - Ancient Woodland
  - Historic Landfill
  - Country Park
  - Local Wildlife Site (LWS)
  - Local Nature Reserve (LNR)

**Note:**  
The arboricultural survey is incomplete and therefore there may be other unidentified veteran trees within the study area.



PO1	18/10/21	For consultation	AD	TL	SM	SG
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Contractor			Designer			
			 Cottons Centre, Cottons Lane, London, SE1 2QG, UK. Tel: +44 (0)20 3980 2000 www.jacobs.com			
Client						
Project						
A12 CHELMSFORD TO A120 WIDENING SCHEME						
Drawing Title						
CADENT GAS PIPELINE DIVERSION OPTION 5 ENVIRONMENTAL CONSTRAINTS SHEET 5 OF 5						
Drawing Status						
S3 - SUITABLE FOR REVIEW AND COMMENT						
Scale @ A3		1:10000	DO NOT SCALE			
Jacobs No.		B36601D1	Rev P01			
Client No.		HE551497				
Drawing Number						
HE551497-JAC-EGN-SCHW-SK-GI-0022						





© Crown copyright 2021.

You may re-use this information (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence: visit [www.nationalarchives.gov.uk/doc/open-government-licence/](http://www.nationalarchives.gov.uk/doc/open-government-licence/) write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email [psi@nationalarchives.gsi.gov.uk](mailto:psi@nationalarchives.gsi.gov.uk).

Mapping (where present): © Crown copyright and database rights 2021 OS 100030649. You are permitted to use this data solely to enable you to respond to, or interact with, the organisation that provided you with the data. You are not permitted to copy, sub-licence, distribute or sell any of this data to third parties in any form.

This document is also available on our website at [www.highwaysengland.co.uk](http://www.highwaysengland.co.uk)  
For an accessible version of this publication please call **0300 123 5000** and we will help you.

If you have any enquiries about this publication email [info@highwaysengland.co.uk](mailto:info@highwaysengland.co.uk) or call **0300 123 5000**\*. Please quote the National Highways publications code **PR156/21**.

\*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls.

These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone. Calls may be recorded or monitored.

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ  
National Highways Company Limited registered in England and Wales number 09346363