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Greater Cambridge Greenways

St Ives Greenway: Outline Business Case

Greater Cambridge Partnership

19 May 2023

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Notice

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Document history

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1. Introduction

Greater Cambridge Partnership (GCP) has a programme of Greenways. A Programme Outline Case (POC), covering the whole Greenways programme, has been produced and was approved by the GCP Executive Board on 28 September 2022.

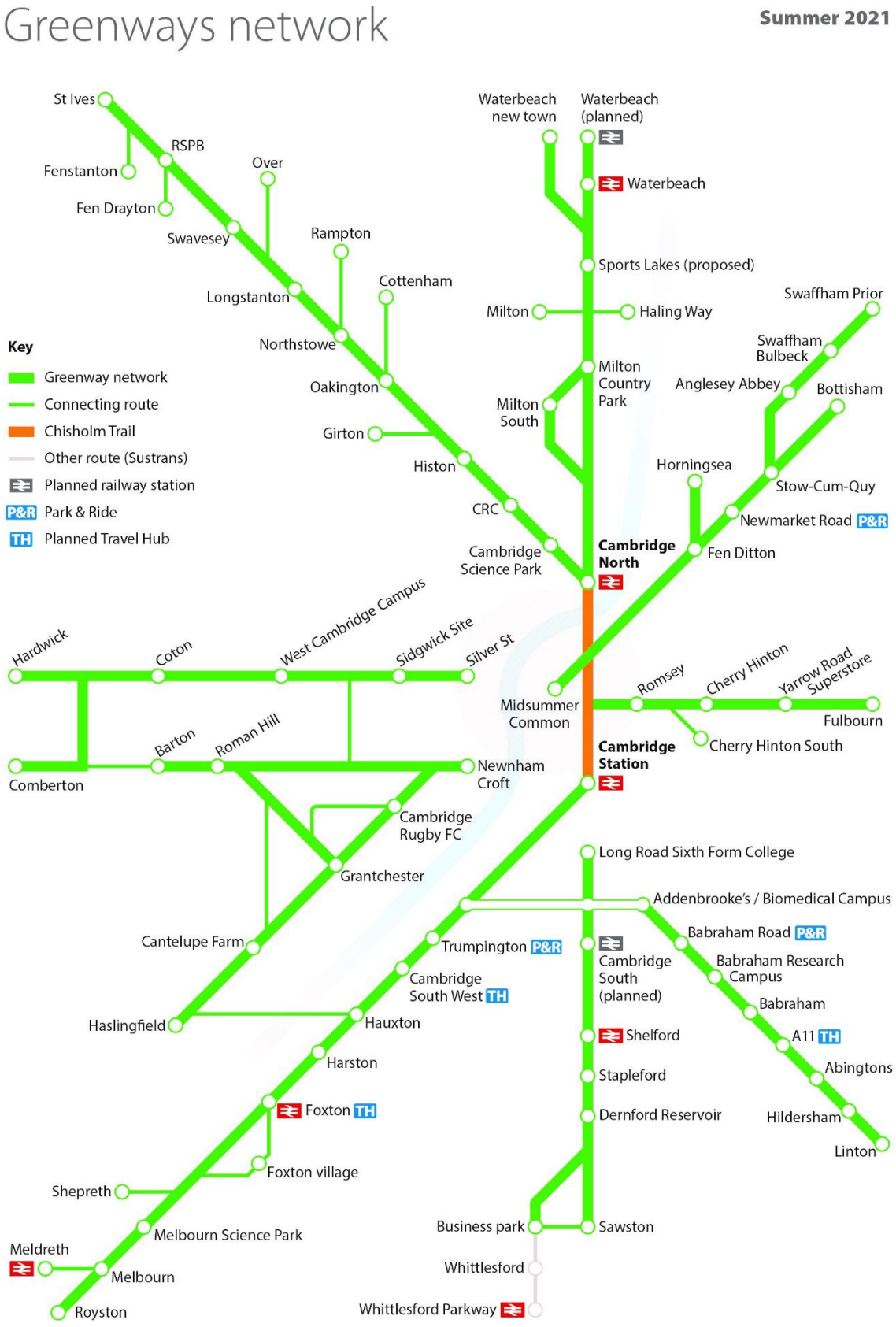
The POC envisaged that each Greenway would have a scheme-specific annex to the POC, acting as a proportionate Outline Business Case (OBC), covering mainly the economic appraisal of that scheme plus certain other scheme-specific matters. **Table 1-1** shows what the OBCs will cover.

Table 1-1 - OBC content

Dimension	OBC content
Strategic	• Scheme-specific engagement/consultation results (will apply to all schemes) • Any major changes to scheme definition since the description given in the POC • Any major elements of the specific case that are unique to a particular scheme
Economic	• The economic appraisal (will apply to all schemes)
Financial	• Scheme costs (will apply to all schemes) • Any scheme-specific differences from the generic position given in the POC – e.g. if a scheme has developer contributions
Commercial	• Any scheme-specific differences from the generic position given in the POC
Management	• Any scheme-specific differences from the generic position given in the POC – e.g. involving land agreements, risk profile, the consents strategy, or future ownership of the infrastructure

This document is the OBC for the St Ives Greenway. It forms an annex to, and should be read in conjunction with, the POC which covers programme-wide matters.

Figure 1-1 – The Greenways network



Source: GCP Greater Cambridge Greenways website

2. Strategic case

2.1. Introduction

The strategic case sets out a case for change that demonstrates how the proposal fits with GCP's priorities, government ambitions and the area being served by the scheme. Most of the strategic case is common to the whole programme and is set out in the POC. The scheme-specific OBCs therefore cover the following:

- Any major changes to scheme definition since the description given in the POC;
- Summary of the scheme's contexts;
- Scheme-specific engagement/consultation results (will apply to all schemes); and
- Any major elements of the strategic case that are unique to a particular scheme.

2.2. Changes to scheme definition since the POC

The scheme definition remains in line with the description given in the POC.

2.3. Contexts

This section outlines the policy and local contexts of the St Ives Greenway. Further details can be found the POC.

2.3.1. Policy context

Planning and transport strategy at all levels focuses on the need to ensure that future development is sustainable and contributes to wider objectives around the protection, enhancement and conservation of environment, cultural and societal assets. They address the need to tackle climate change and meet Net Zero targets. Strategies also outline the need to ensure future developments contribute to a good quality of life and the health and wellbeing of local communities.

Delivery of the St Ives Greenway will contribute to these key strategic policies, through delivering an active and sustainable mode of travel via a green infrastructure network which will encourage a modal shift away from cars. In doing so, the programme will deliver multiple environmental, social, and economic benefits, and contribute to the reduction on greenhouse gas emission required to meet Net Zero targets by 2050.

2.3.2. Geographical Scope of the Scheme

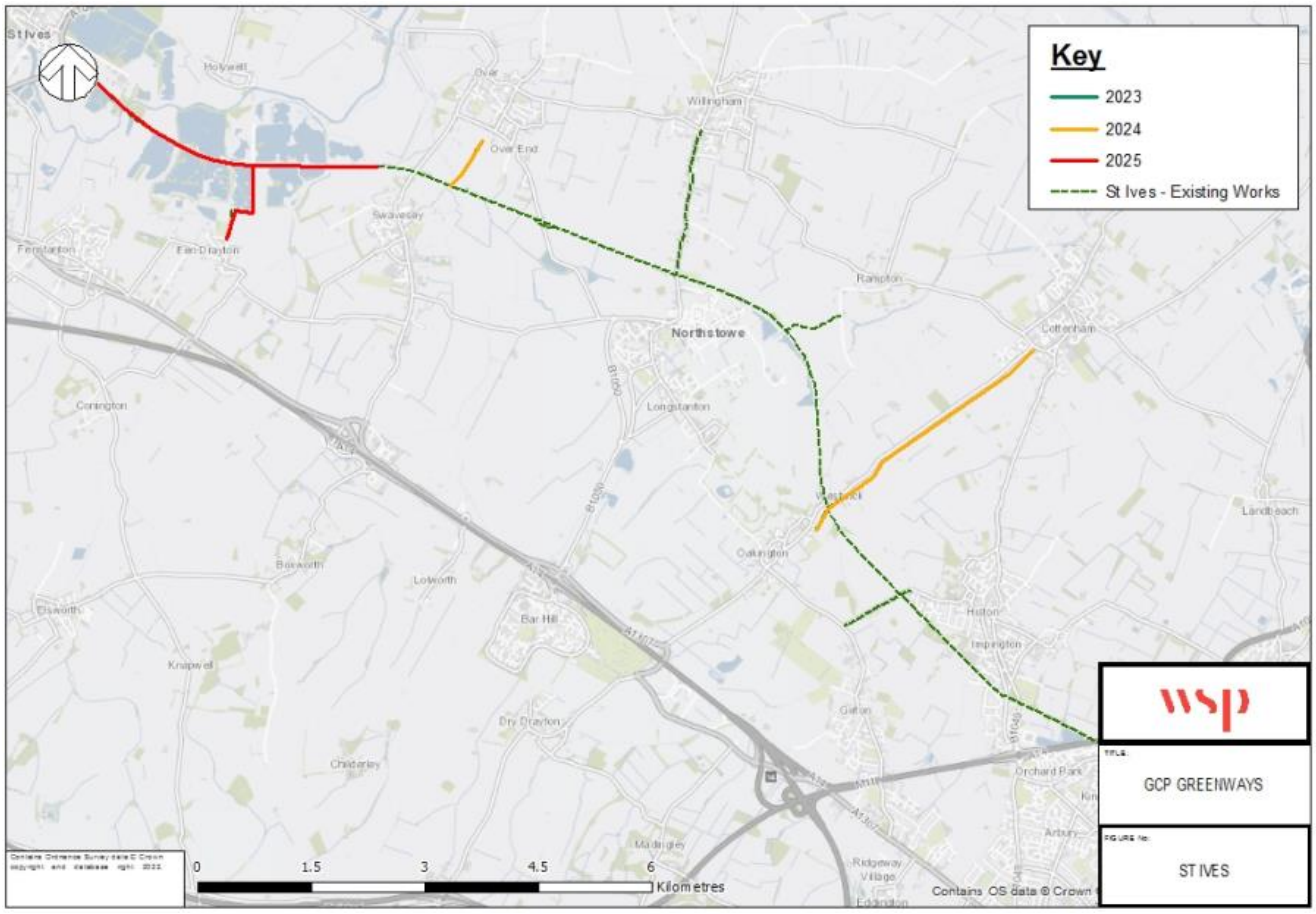
St Ives is located 22km west of Cambridge across flat terrain. In contrast to the other Greenway routes, St Ives is already served by a very popular high quality, continuous, all-weather, 4m wide tarmac shared use path running parallel to the guided busway track. The focus of proposals for this Greenway is on improved links to villages adjacent to the route. Additionally, wayfinding will be enhanced along the busway and the improved links.

The St Ives Greenway (**Figure 2-1**) will follow the busway path, connecting St Ives with Cambridge and the Science Park. This route will provide connectivity between local villages and the existing busway.
The proposals involve upgrades to existing roads and public rights of way, which connect local communities to the existing guided busway. The proposals would improve provision for people walking, cycling and, where appropriate, horse-riding.

The proposed spurs connecting to the main line of the St Ives Greenway are:

- A new bridleway between Over and the guided busway along the route of the existing footpath, providing an off-road route from Over to the Greenway and connecting to an existing bridleway to Swavesey.
- A spur from Fen Drayton to the Greenway for all users, by enhancing conditions including resurfacing Holywell Ferry Road and including traffic calming.
- A proposed bridleway connecting Cottenham to Westwick via the busway, on the southern side of Oakington Road.
- A spur between Oakington and Westwick via the busway, enhancing shared use paths, upgrading crossings and improving traffic calming.

Figure 2-1 – The St Ives Greenway



Source: Greenways paper to Joint Assembly 8 Sept 2022
** Note this Greenway Route Map is not fully confirmed. The work along the existing busway at Fen Drayton, previously planned for 2025, is not currently part of this proposal due to flood monitoring assessments taking place before the work is confirmed.*

2.3.3. Economic, Social, and Environmental Context

Cambridge is home to one of the fastest growing economies in Europe and is renowned for being a leading centre for research, innovation, and technology. The centre of Cambridge has the largest share of jobs in Cambridgeshire. The presence of the Green Belt means recent growth has had to 'leapfrog' the protected zone into physically separate urban areas, and as such many of those employed in Cambridge commute from the surrounding area.

The area immediately surrounding much of the proposed St Ives Greenway is generally affluent. However, there are some significant areas of deprivation in the north-east of Cambridge, at the south end of the St Ives Greenway. Along the proposed route, there is a higher concentration of elderly people when compared to the national averages for England (13.5% to 7.8%), an average proportion of children (19.8% to 18.9%), and almost twice the proportion of no car households (21.3% to 10.7%).

Cambridge city centre has had an Air Quality Management Area (AQMA) since 2004 due to high levels of Nitrogen Dioxide from excessive traffic levels. To improve air quality, a series of Air Quality Management Plans have been implemented and integrated into the local transport plans, with the latest being the Cambridge Air Quality Management Plan (2018-2023). Noise has a large impact on both the physical and mental health of those living and working in Cambridge. Traffic noise can be a significant contributor to ambient noise levels. The delivery of the Greenways will help to improve air quality and noise levels within the city centre by encouraging modal shift away from cars and towards active travel modes.

2.3.4. Transport Context

The main line of the St Ives Greenway uses national cycle network route 51, which follows the maintenance track of the Cambridgeshire Guided Busway (CGB) from Cambridge North to St Ives Park and Ride (P&R) site. Shared use paths separated from the road already exist on many roads connecting villages to the busway, including:

- Along Station Road between Swavesey and the busway;
- Along Over Road between Over and the busway;
- Along Station Road between Willingham and the busway;
- Along New Road between Oakington/Girton and the busway; and
- Along Cottenham Road between Cottenham and Histon/Impington, although here there is no direct, fully segregated connection to the busway itself.

Additionally, unsurfaced roads or paths connect Fenstanton and Fen Drayton to the busway.

Being sited on the maintenance track for the CGB, the main line of the St Ives Greenway parallels the busway for its entire northern route from St Ives to Cambridge North Railway Station and provides direct access to the busway stops at:

- St Ives P&R site;
- Fenstanton;
- Swavesey;
- Longstanton P&R site;
- Oakington;
- Histon and Impington;
- Cambridge Regional College/Orchard Park;
- Cambridge Science Park; and
- Cambridge North Railway Station.

Between St Ives and Cambridge Regional College/Orchard Park, the busway is served by Stagecoach's busway routes A, B and C, with headways across all services being approximately 10 minutes or less for much of the day and services operating between approximately 5am and 1am the next day. From Cambridge Regional College/Orchard Park to Cambridge Science Park, routes B and C parallel the St Ives Greenway and from Cambridge Science Park to Cambridge North Railway Station, only route B parallels the St Ives Greenway. These busway routes provide direct connections to destinations beyond the busway/St Ives Greenway including Hinchingbrooke Hospital, Huntingdon and Cambridge city centre.

At the northern end of the St Ives Greenway, St Ives Bus Station has services connecting to surrounding towns and villages, including Ramsey, March, Bar Hill and Somersham. Of these services, the route 1A – operated by the A2B Travel Group – between St Ives and Bar Hill provides an infrequent connection to villages off the St Ives Greenway, such as Fen Drayton, Fenstanton and Over.

Approximately halfway along the St Ives Greenway, Longstanton P&R site acts as the terminus of some non-busway services. The route 5 – operated by Stagecoach – from Cambridge city centre via Bar Hill to Longstanton P&R site runs roughly twice an hour between around 5am and 6pm and then hourly until around 11pm. The route 5A – also operated by Stagecoach – runs on a circular route from Longstanton P&R site serving villages along the St Ives Greenway corridor, namely Swavesey, Over and Willingham hourly between around 6am and 7pm, with the first service only departing from Fenstanton via Fen Drayton at 6am and the last service only returning there at around 7:30pm.

At the southern end of the St Ives Greenway, Cambridge North Railway Station provides direct rail connections to London, Ely, Kings Lynn, Norwich and Stanstead Airport.

The main road along the corridor is the A14/A1307, which parallels the St Ives Greenway at a distance between Cambridge and Fenstanton, continuing on towards Huntingdon.

2.3.5. Stakeholder and public engagement

The *St Ives Greenway Consultation Summary Report*, will be issued in parallel with this OBC, setting out the stakeholder and public engagement that took place in 2023. Its key points will be summarised in this section.

2.3.6. Stakeholder engagement

Key stakeholders associated with the St Ives Greenway were engaged with throughout 2022/2023 and will continue to be engaged with as the project progresses. Stakeholders ranged from council members, partner authorities, representatives of walking, cycling and equestrian groups and relevant landowners whose agreement is needed in order to construct and manage the route. The *Engagement Summary Report* sets out the activities undertaken.

2.3.7. Public consultation

A public consultation period was held from 6th February to 31st March 2023. The *Engagement Summary Report* has been prepared and outlines the activities undertaken as part of this, and the survey feedback that was received.

A total of 435 responses were received to the St Ives Greenway consultation process as a whole, 264 (61%) of which were through the Oakington to Cottenham spur and 171 (39%) were through the Over and Fen Drayton spur. Overall, feedback received was supportive to all sections of the proposed St Ives Greenway. With this said, a number of suggestions and concerns were raised that will be considered and possibly incorporated into the design of the spurs moving forward.

All spurs received a similar proportion of support, although in terms of volume the Oakington to Cottenham spur received the most (57 responses). The general consensus is that improvements along Oakington Road, connecting Oakington and Cottenham via Westwick, are long overdue and that the proposals would greatly enhance connectivity and safety for those making the journey. With this said, many respondents did raise concern that the current crossing alignment to the north of Westwick would be undesirable, as it would cause cyclists and other users to come to an abrupt stop. Lighting and ecological impacts were also key themes along this section of the route. Whilst it is identified that these elements will be developed in greater detail as the scheme progresses, it is noted that providing suitable lighting and minimising environmental impacts are crucial to the success of the scheme.

Proposed resurfacing of Hollywell Ferry Road as part of the Fen Drayton spur of the St Ives Greenway was met with strong support, with many respondents indicating that whilst needed, surfacing should be sympathetic to all users. Upon further analysis of the responses, there were numerous suggestions to reinstate a grass strip along east-west sections of Hollywell Ferry Road which had previously been eroded due to vehicles swerving to avoid potholes.

Whilst the proposed Over bridleway was met with support, there were numerous concerns raised over the necessity of the improvements. Whilst it was identified that the Over spur would benefit horse-riders, many respondents felt that the scheme is superfluous given the existing provision along Over Road less than half a mile to the west. Further concerns were raised concerning the safety of the uncontrolled busway crossing and the environmental impact the scheme would have on the area. As with the Oakington to Cottenham spur, suitable lighting and minimal environmental impacts were frequently raised as areas of focus, something which will be considered in greater detail as plans progress.

2.3.8. Actions taken in response

Information on actions taken in response to the engagement feedback has been provided separately, in parallel to this OBC. It outlines where the project team has acted on suggestions and made changes to the design of the Greenway, or where they have not made changes and the reasons for this.

Some of the actions that have been taken forward include:

- Reviewing lighting on off-road routes
- Minimising the removal of trees where possible, and where unavoidable replacing removed trees in line with biodiversity targets.
- Reviewing the existing busway crossing at Over.
- Reviewing the design where the proposed shared used path abruptly connects to the carriageway along the Oakington spur.

2.4. Any major elements of the strategic case that are unique to the scheme

2.4.1. Greenway utilises the existing busway

In contrast to the other Greenway routes, St Ives is already served by a high quality, continuous, 4m wide tarmac shared use path running parallel to the busway track. The focus of proposals for this Greenway is on improved links to villages adjacent to the route. Additionally, wayfinding will be enhanced along the new improved spurs and the existing busway. This will impact the Benefit-Cost Ratio (BCR) due to the improvement proposals being located on minor spurs into the Greenway and hence lower demand than the existing busway bridleway that forms the main line of the Greenway.

2.4.2. The Busway

The active travel route which runs adjacent to the busway for its full length is already a highly popular commuter and leisure cycling route between St Ives and Cambridge. The busway provides a safe and pleasant active travel connection for villages between St Ives and Cambridge.

2.4.3. Northstowe

Northstowe is a new town under construction between Over and Oakington adjacent to the busway. When complete it will contain 10,000 new homes. This large population growth along the St Ives Greenway would make active travel modes a more appealing option for the new residents of Northstowe immediately. This development is likely to affect the mainline busway demand and create a better-connected cycling network in the area. There is potential for this development to increase the usage on the spurs for local trips, however this number is likely conservative and has not been assessed.

2.4.4. Cambridge Science Park and Cambridge North

At the Cambridge end of the busway there are some significant sites which many people must travel to for work or education. Cambridge Regional College, Cambridge Science Park and Cambridge Business Park are all directly adjacent and well connected to the St Ives Greenway route. Cambridge Science Park in particular is a major job centres for the city, and many people commute from the surrounding South Cambridgeshire to work there. Also at this end the St Ives Greenway would meet Cambridge North Station, which provides regular train services to other major locations such as King's Lynn, Central Cambridge, and London.

2.4.5. West of Cottenham housing developments

In Cottenham there are three new housing development sites on the north side of Oakington Road that when complete will contain approximately 460 new houses. These developments will increase growth on the Oakington to Cottenham spur and have been included in the assessment, where assumptions can be found in section 3.4.2.

2.4.6. Varsity Way Cycle Route

A strategic case has been put forward for the Varsity Way Cycle Route, a proposed 200km long route linking Oxford and Cambridge. The route proposes to link into Cambridge along the St Ives busway, which has the potential to increase trips on the greenway and gain benefits from improved wayfinding along the busway. This number is likely to be relatively small and, as the proposal is at an early stage, has not been assessed.

3. Economic case

3.1. Introduction

The economic case demonstrates the scheme's value for money.

For the greenways programme, the economic case for each individual corridor is wholly contained within its OBC. An overall approach to appraisal that covers all the Greenway corridors has been agreed with GCP. The detailed technical method for each corridor may vary according to the needs of each corridor but will be in line with the overall approach.

The appraisal is on a proportionate basis aimed at indicating the overall scale of benefits. Each greenway corridor is appraised in its own right, assuming that none of the other Greenways are in place apart from the committed Chisholm Trail, but any key corridor-specific synergies between corridors will be identified.

3.2. Approach to economic appraisal

The appraisal has been undertaken in line with the Department for Transport's *Transport Analysis Guidance* (TAG), which in turn is aligned with the Treasury *Green Book*. All costs and benefits have been converted to 2010 prices and values, using the parameters in the November 2022 TAG data book.

The scheme opening year is assumed to be 2025. The appraisal period is 20 years, reflecting the likely asset life of the main physical measures before major renewal is required.

The majority of benefits are appraised using the DfT's Active Mode Appraisal Toolkit (AMAT) (November 2022 version). Details of this methodology are explained in section 3.4. The AMAT methodology evaluates only the benefits to pedestrians and cyclists: scooters, equestrians, and any other active travel modes are not included. The number of equestrians and others are negligible, with only a handful of each recorded in the counts described in section 3.3.1. Scooters were also recorded in small numbers, more than equestrians or others, but still a negligible number. The numbers of equestrians, scooters, and others is considered minute enough in comparison to pedestrians and cyclists that it will not have a material effect on the conclusions.

3.3. Demand

3.3.1. Baseline demand

Baseline demand was estimated from manually classified counts made in November 2022 at a range of junctions along the corridor, which can be seen in **Figure 3-1**. Each count covered three mid-week days from 0700 to 1900. The counts included pedestrians, cyclists, equestrians, scooters, and others. At each count location, the daily totals were averaged across the three days to produce an average daily weekday demand figure.

To take account of seasonal variations in flows, an annualisation factor was derived from 2018 cycle flows over the network of fixed cycle counters installed throughout Cambridgeshire, as available from the Cambridgeshire County Council website. The factor for November was determined to be 1.23 and this was applied to the count data to produce the seasonally-adjusted final baseline (2022) demand figure.

Figure 3-1 – Count locations for the St Ives Greenways

3.3.2. Do-minimum demand

The do-minimum demand represents the future active travel demand along the corridor if the scheme were not to be built. It reflects background demand growth and is created by applying a growth factor to the baseline demand.

In line with the standard process in the DfT's AMAT workbook, the do-minimum demand was input to the workbook as the annualised baseline demand and is scaled within the workbook from the scheme opening year for 20 years, in line with TAG guidance. A background growth rate in trips of 0.75% was assumed over this period based on National Travel Survey Data from 2006 to 2016.

Conservatively, no extra allowance has been made for specific sites on the corridor, such as the Cambridge science park, which may generate a higher growth in journeys than this area average.

3.3.3. Do-something demand

The do-something demand represents the future active travel demand along the corridor if the scheme is built. It reflects the impacts of the scheme and is created by applying growth factors (or 'uplifts') to the do-minimum demand. The daily average flows at each count arm derived from the count data were uplifted using the factors described below.

The uplifts are those which WSP calculated for their Greenways OBCs. WSP derived an uplift of 25% for cycling demand and 10% for walking demand.

For cycling the uplift is based on traffic surveys before and after comparable cycling schemes in the GCP Impact Evaluation Evidence Paper (2019), Cycle City Ambition Programme (2013-2018), Outcomes of the Cycling City and Town Programme.

For walking the uplift is based on case studies in Making the Case for Investment in the Walking Environment (2011).

3.4. Benefits estimated using the Active Mode Appraisal Toolkit (AMAT)

3.4.1. Overview

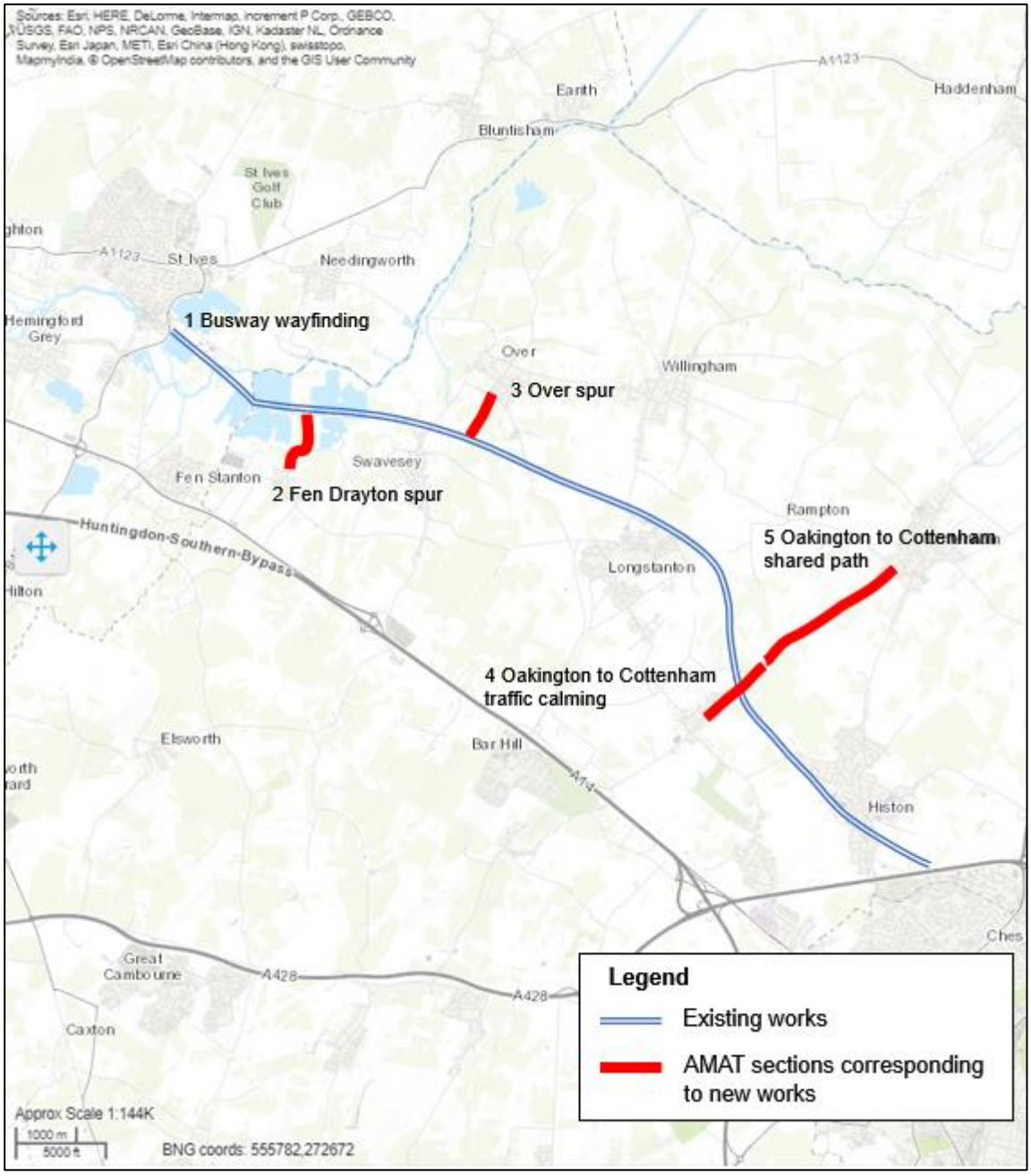
In line with TAG Unit A5-1, the DfT's Active Mode Appraisal Toolkit (AMAT) (November 2022 version) has been used to estimate most of the scheme's monetised benefits from improved active travel infrastructure. The tool considers the impacts in terms of physical activity, absenteeism, journey quality, environmental, indirect tax and congestion. Do-minimum and do-something demands are inputted to the AMAT along with provisions for active travel with and without the scheme.

Journey quality benefits were assessed using separate AMAT workbooks for each key section of proposed intervention. Health and mode shift benefits were appraised separately in an additional corridor-wide AMAT workbook to avoid double-counting of individual users and trips. Costs were appraised separately from the AMATs to avoid the need to apply some inflation to the input values separately, as is the case in AMAT workbooks.

3.4.2. AMAT sections and their demand volumes (for journey quality benefits)

Figure 3-2 shows the Greenway corridor and how it has been split into individual AMAT sections corresponding to the key areas of intervention.

Figure 3-2 - AMAT sections



For each section, the do-minimum and do-something cycling and walking volumes were estimated by averaging the relevant volumes at the count locations along that section.

Table 3-1 summarises these, along with the intervention lengths.

Section 1, the busway is an existing off-road path (designed as a bridleway) that runs parallel to the busway. Wayfinding will be enhanced along this section. As the demand impact of wayfinding enhancements is unclear, a sensitivity test using a 5% demand uplift on the busway has been carried out.

Section 2, the spur from Fen Drayton to the Greenway, is currently a public byway used by both vehicles and non-motorised users (NMUs). The Greenway scheme aims to enhance conditions including resurfacing Holywell Ferry Road and traffic calming.

Section 3, the Over spur, is currently an unpaved public footpath across a field with a small bridge over a stream. With the scheme interventions, this would be upgraded from footpath to a shared use bridleway,

including replacement of the bridge. As such, in the existing state it is not suitable for cycling and very few cycles were observed using this route. Additionally, the route may not be suitable for walking during or after wet weather. On two of the count days (15 & 17 November 2022) there were periods of rain which may have led to the walking and cycling counts for this route being reduced. To account for this and some reassignment to the new route, 50% of the pedestrians and cyclists recorded on the parallel route along Over road were added to the counts for section 3.

Section 4, the spur along part of Station Road between Oakington and Westwick via the busway is used by all users with no specific cycling provision. Improvements to this spur include providing enhanced shared use paths, upgrading crossings and improving traffic calming.

Section 5, the spur along Oakington Road between Cottenham and Westwick is used by all users with no specific cycling provision. This spur is to be improved through the provision of an off-road segregated cycle track, with a proposed bridleway on the southern side of Oakington Road. As outlined in section 2.4.5, new housing development sites on the North side of Oakington Road will impact the future growth on this spur. The developments represent an approximately 18% increase in the number of dwellings in Cottenham, and this figure has been used as an uplift to the flows to and from Cottenham (18% uplift).

For Cottenham-Cambridge trips, cyclists are currently likely to travel via Histon Road to the busway. The alternative route via Oakington Road has no cycling infrastructure and covers a longer distance and journey time. After the proposed interventions, some users might switch to travelling via Oakington Road and the busway, due to the new off-road segregated path on Oakington Road with improved journey quality and possible higher speeds along the route. However, it would still be a longer distance than via Histon Road. It is therefore assumed that any re-routing would be broadly neutral in terms of benefits, and hence this re-routing is not considered further.

Table 3-1 – Cycling and walking bi-directional volumes in each AMAT section

AMAT section	Description	Length (km)	Observed average along length		Annualised average along length		DS Average along length	
			Pedestrian	Cycling	Pedestrian	Cycling	Pedestrian	Cycling
1	Busway	20.2	47	131	58	161	58	161
2	Fen Drayton spur	1.3	38	25	47	30	51	38
3	Over spur	0.91	38	0	47	0	52	0
3	Over spur with DS reassignment	0.91	-	-	-	-	102	127
4	Oakington to Cottenham (traffic calmed)	1.43	82	45	106 *	57 *	117	71
5	Oakington to Cottenham (shared path)	2.9	201	16	294 *	23 *	324	29

Source: Scenarios spreadsheet, 'AMAT' tab

** The annualised average for section 5 includes a further 18% uplift representing the impact of developments in Cottenham. The annualised average for section 4 includes a proportion of that further uplift, representing the impact of those developments being diluted among other flows on that section.*

3.4.3. AMAT demand volumes (for health and mode shift benefits)

A different approach for calculating demand across the whole greenway route is needed to get a more accurate result. Using a sum of flows from **Table 3-1** risks double counting pedestrians or cyclists who have travelled along more than one of the AMAT sections. There may also be pedestrians or cyclists who do not use the full length of an AMAT section, who will be better accounted for by the approach described in this section.

Count data and local knowledge were used to identify the main origin-destination walking and cycling flows along the corridor. The volume of each flow (in the baseline, DM and DS scenarios) was estimated by averaging the count data for relevant movements along the length of the flow. A typical or average trip distance was also estimated for each flow.

The total of the key flows which follow a route on the scheme is used for the health and mode shift benefits. These flows feed into the AMAT analysis of health and mode shift benefits, but also illustrate the main current active travel uses of the corridor.

Table 3-2 shows the main relevant pedestrian flows and **Table 3-3** shows the main relevant cyclist flows. The largest cyclist flows are on the busway, where the flows were not uplifted in the core do something scenario. The estimated flows are bi-directional averages for the period 7am-7pm on typical weekdays.

Table 3-2 – Estimated key pedestrian flows on the Greenway route

Flow ID	Flow Definition	Observed Flow	Annualised Flow	DS Flow
1	St Ives - MCC1	37	45	45
2	MCC1 - MCC2	29	36	36
3	MCC2 - Fen Drayton	38	47	51
4	MCC2 - MCC3	26	33	33
5	MCC3 - MCC4	58	71	71
6	MCC4 - MCC5	146	180	180
7	MCC5 - Over	75	47	102
8	MCC5 - MCC8	14	17	17
9	MCC8 - MCC10	19	24	24
10	MCC10 - Oakington	124	153	168
11	MCC10 - Cottenham	121	177	194
12	MCC10 - Cambridge	35	43	43

Source: Scenarios spreadsheet, 'flows 50% reassignment' tab

Table 3-3 – Estimated key cyclist flows on the Greenway route

Flow ID	Flow Definition	Observed Flow	Annualised Flow	DS Flow
1	St Ives - MCC1	131	162	162
2	MCC1 - MCC2	116	143	143
3	MCC2 - Fen Drayton	25	30	38
4	MCC2 - MCC3	110	136	136
5	MCC3 - MCC4	104	128	128
6	MCC4 - MCC5	117	144	144
7	MCC5 - Over	82	0	127
8	MCC5 - MCC8	73	90	90
9	MCC8 - MCC10	199	246	246
10	MCC10 - Oakington	78	96	120
11	MCC10 - Cottenham	14	20	25
12	MCC10 - Cambridge	265	328	328

Source: Scenarios spreadsheet, 'flows' tab

3.4.4. Trip distances

The default AMAT walking and cycling trip lengths were used.

3.4.5. Estimation of journey quality benefits

The AMAT cycling journey quality benefits are based on assigning the route section to one of AMAT's limited number of infrastructure categories for both current and proposed provision. **Table 3-4** shows the 'real world' current and proposed provision, and the AMAT categories to which the section has been assigned.

Table 3-4 – AMAT cycling infrastructure classifications

Ref	Section	Current infrastructure (actual)	Proposed infrastructure (actual)	AMAT category - current *	AMAT category - proposed *
1	Busway	Off-road shared use path	Off-road shared use path	Off-road segregated cycle track	Off-road segregated cycle track
2	Fen Drayton spur	No provision	Traffic calming	No provision	Shared bus lane
3	Over spur	No provision	Off-road shared use path	No provision (see also note below)	Off-road segregated cycle track
4	Oakington to Cottenham (traffic calmed)	No provision	Traffic calming	No provision	Shared bus lane
5	Oakington to Cottenham (shared path)	No provision	Off-road shared use path	No Provision	Off-road segregated cycle track

** Note: the existing provision and the scheme proposals are shown in the 'actual' columns. The entries in the 'AMAT category' columns are purely technical parameters that are used to represent (and may be proxies for) levels of journey quality enhancement; they do not necessarily correspond to the actual nature of the current or proposed provision on the ground.*

In some cases, it is not clear what the most applicable cycling infrastructure AMAT category may be. AMAT has no category for traffic calming measures, and as such 'Shared bus lane' has been selected as a substitute. This provides less benefit than other categories, but still accounts for the improved experience of cycling or walking on a traffic calmed route.

The AMAT walking journey quality benefits are based on whether the route has, or is proposed to have, a range of infrastructure relevant to walking. The existing provision was identified from Google Street View and validated with site visits, and the proposed provision was identified from scheme drawings.

3.4.6. Estimation of health and mode shift benefits

As described in section 3.4.1, the health and mode shift benefits were estimated using a single corridor-wide AMAT workbook for this purpose.

As described in section 3.4.4, the sum of the cycling and walking volumes across all the flows shown in **Table 3-2** and **Table 3-3** represents the DM and DS 'headcounts' of people using the corridor. These headcounts form the DM and DS volumes for health and mode shift. The average trip length is then calculated from a flow-weighted average and the total flow is the sum of all the individual flows.

Table 3-5 shows the headcounts and their average weighted trip length. As AMAT health and mode shift benefit calculations do not require the proportion of a trip using the intervention, the intervention lengths can be ignored for this analysis. The flow is the sum of the Annualised and DS flows in **Table 3-2** and **Table 3-3**.

Table 3-5 – Corridor attributes for health and mode-shift benefits

Mode	Scenario	Average Trip Length (km)	Flow
Cycling	Annualised	4.84	1,522
	DS		1,685
Walking	Annualised	1.1	874
	DS		966

Source: Scenarios spreadsheet, 'flows' tab

3.4.7. Other AMAT parameters and costs

The scheme was appraised using 305 (6 days a week not including bank holidays) days a year rather than the AMAT default 253 (weekdays only not including bank holidays). This was done based on evidence from permanent counters which showed a high level of weekend use, particularly towards the St Ives end of the busway around the Fen Drayton lakes. The Saturday and Sunday use were still lower than any typical weekday, so 6 days a week was chosen rather than 7. All other default AMAT parameters were retained.

Costs were appraised in a separate workbook following the DfT's TAG Unit A1-2 (Scheme Costs) guidance. This workbook was cross checked against an AMAT costs appraisal and found to return the same values for a given scheme but avoided the need to apply some inflation to the input values separately, as is the case in AMAT workbooks. The cost factors used in this costs workbook were obtained from the November 2022 DfT TAG Data Book (v1.20.1) in line with the November 2022 AMAT workbook.

3.4.8. AMAT results

Table 3-6 shows the total benefits summed across all the journey quality AMATs and the health and mode shift AMAT.

Table 3-6 – AMAT-based benefits

Category	£'000s (2010 prices and values)
Congestion	27.17
Infrastructure maintenance (counts towards PVC not PVB)	0.59
Accidents (reductions due to mode shift)	4.20
Local air quality	0.62
Noise	0.22
Greenhouse gases	7.06
Reduced risk of premature death	1163.79
Absenteeism	188.30
Journey ambience	252.98
Indirect taxation (e.g. loss of road tax due to mode shift)	-8.25

3.5. Journey time benefits for existing users

The St Ives Greenway route will establish a new direct cycle connection between Over and the busway/Swavesey. Currently, the most direct way for cyclists to travel between these two destinations is via the Over Road/Station Road junction with the busway. The journey time improvements have been calculated for two movements at the junction due to the different routes and journey distances.
Using an average cycling speed of 15 km/h (AMAT default value derived from NTS data), the total travel time saving was calculated comparing the current and proposed situation. This time saving was valued using the Value of Time for commuter and other users, assuming a 56.4% commuter and 43.4% other user split. This was multiplied by the daily demand for the relevant turn and annualised prior to incorporation into the economic appraisal model.

The route was calculated from Over (Glover St/Hilton St) to Busway (SB). The current route via Over Road/ Station Road is a distance of 1.76km. The proposed greenway spur will provide a new off-road segregated cycle track over the current public footpath – reducing the length of the journey to 1.29km, a saving in travel distance of 0.47km.
The demand included in the analysis for the Over (Glover St/Hilton St) to Busway (SB) movement considers the demand turning between Over Road at the Over Road/Station Road junction site count and the busway. Only 70% of this demand has been assumed to gain the journey time benefit as some individuals living to the North of Over may still use the longer route.

Table 3-7 – Journey Time Assumptions, Over (Glover St/Hilton St) to Busway (SB)

Criteria	Assumption
Time Saving	1.88 minutes

2010 VOT (£/hr)	Commuter – 9.95 Other – 4.54
Weighting Factor	Commuter – 56.4% Other – 43.6%
Number of people using the route (daily)	12
2010 Monetised Benefit £ (daily)	2.88
2010 Monetised Benefit £ (annual)	879.18

The route was calculated from Over (Glover St/Hilton St) to Swavesey (High Street/Market Street). The current route via Over Road/Station Road is a distance of 2.4km. The proposed greenway spur will provide a new off-road segregated cycle track over the current public footpath – reducing the length of the journey to 2.15km, a saving in travel distance of 0.25km.

The demand included in the analysis for the Over (Glover St/Hilton St) to Swavesey (High Street/Market Street) movement considers the demand turning ahead between Over Road and Station Road at the Over Road/Station Road junction site count. Only 50% of this demand has been assumed to gain the journey time benefit as some individuals living to the North of Over may still use the longer route, and the cycle path from the busway to Swavesey is not paved and could be less desirable in the rain even with a shorter route.

Table 3-8 – Journey Time Assumptions, Over (Glover St/Hilton St) to Swavesey (High St/Market St)

Criteria	Assumption
Time Saving	1.00 minutes
2010 VOT (£/hr)	Commuter – 9.95 Other – 4.54
Weighting Factor	Commuter – 56.4% Other – 43.6%
Number of people using the route (daily)	64
2010 Monetised Benefit £ (daily)	15.28
2010 Monetised Benefit £ (annual)	4,661.60

The two annual values of journey time savings in **Table 3-7** and **Table 3-8** were then projected and discounted in the appraisal model for the 20-year appraisal period. **Table 3-9** shows the total benefits of the journey time saving for existing users as a result of more direct routeings, associated with the new cycle facility for the Over spur.

Table 3-9 – Journey Time Saving

Impact	£, 2010 PV over appraisal period
Journey Time Saving	63,297

The scheme proposals will result in a journey time saving of £63,297 over the 20-year appraisal period.

3.6. Safety benefits

Safety benefits from mode-shift (due to reduced motor vehicle kilometres) are estimated through the AMAT as described above.

In addition to this, the scheme is expected to improve safety through the physical measures themselves making the route safer than it is today. This has been estimated in other Greenways by reviewing recent collision data along the route, identifying the collisions involving active travel users, and identifying those which may have been prevented by the scheme (had it been in place). The safety analysis showed that there are no accidents within the three proposed segments and therefore the conclusion of this safety analysis is that there is no collision reduction value.

3.7. Social and distributional impacts

3.7.1. Social Impact Appraisal

3.7.1.1. Methodology

The Social Impact Appraisal was undertaken in accordance with requirements set out in Transport Appraisal Guidance (TAG) Unit A4-1 published by the Department of Transport (DfT). For the proposed interventions, a proportionate approach has been undertaken to deliver the social impact assessment. A qualitative assessment of each of the social impact indicators has been undertaken and supplemented by quantitative measures where appropriate.

3.7.1.2. Safety

The scheme intends to deliver improvements to the walking and cycling provision between rural settlements and the busway, with new shared use paths, crossings and traffic calming measures in places. The scheme will create a safer and better-connected environment for walking, cycling and horse-riding for residents in Over, Cottenham, Oakington and Fen Drayton, as well as others that use the existing busway corridor. The interventions are expected to contribute to reducing risk of collisions for all active mode and highway users (or at least maintain current level of risk). As a result, safety benefits are anticipated from the implementation of the scheme and, overall, it is expected that the impact of the scheme on safety and collisions will be **Slight Beneficial**.

3.7.1.3. Physical activity

The combined effect of improved pedestrian and cycle connectivity and a mode shift from car to active travel in the area would result in a small increase in physical activity. As providing new active travel infrastructure is an effective means of promoting an increase in active commuting, the overall impact assessment for Physical Activity has been appraised as **Moderate Beneficial.**

In summary, the provision of walking and cycling is expected to bring further footfall and to positively impact in the attractiveness of walking and cycling trips. The active mode appraisal summary outlined benefits (2010 prices and values) from the scheme relating to physical activity, a £188,300 PVB from reduced absenteeism and £1,163,790 from a reduced risk of premature death due to changes in walking and cycling.

3.7.1.4. Security

At this stage of the scheme development, security measures have not been confirmed in detail. In accordance with the requirements of TAG Unit 4-1, an indicative high-level assessment of key security indicators is shown below in **Table 3-10**.

Table 3-10 - Summary of security appraisal

Security Indicator	Relative Importance	Scheme Impact	Comments
Site perimeters, entrances and exits	Medium	Neutral	The scheme is not expected to have any material impact on site perimeter issues.
Formal surveillance	High	Slight beneficial	Changes to CCTV have not been confirmed as part of the scheme at this stage. However, proposals should incorporate good-quality street lighting and CCTV to improve safety and security of users.
Informal surveillance	Medium	Neutral	Information regarding informal surveillance is not available at this stage. However, it is not anticipated that the scheme will have a material impact on informal surveillance.
Landscaping	Medium	Neutral	Little/ no change to current landscaping which would impact on security.

Lighting and visibility	High	Slight beneficial	Good quality lighting should be provided in any locations where new pedestrian and cyclist routes are proposed or where better lighting is needed. A lighting strategy will be developed in a later stage.
Emergency call	Low	Neutral	There will be no changes to the provision of emergency phones as part of this scheme.

As the appraisal has resulted in neutral levels on most security indicators, the overall assessment for security is considered to be **Neutral**. Care should be taken when considering the result of this assessment because the level of data available affecting security are limited at this stage.

3.7.1.5. Severance

Community severance is defined in TAG Unit A4-1 as the separation of residents from the facilities and services they use within their community caused by substantial changes in transport infrastructure, or by changes in traffic flows. This primarily concerns non-motorised modes, especially pedestrians.

Based on the interventions proposed and given the existing conditions it is likely that the effect of the St Ives Greenway on severance will be beneficial. Key reasons supporting this assessment are described below:

Oakington to Cottenham link

- New 5m bridleway, 3m shared use path and 2m grass verge along Oakington Road.
- Widening of existing shared use paths and cycle lanes.
- Enhanced and modified crossing facilities including to access new housing development off Oakington Road.
- Proposed set back uncontrolled crossing on Oakington Road.
- New raised tables and sinusoidal speed humps for traffic calming.

Fen Drayton link

- Widening of footway between Daintrees Road and High Street.
- Resurfacing of existing byway.

Over link

- Replacement of staggered footbridge over Swavesey Drain to make it accessible to walkers, cyclists and horse-riders.
- Paths widened to 3m and resurfaced.
- 2.5m grass verge proposed alongside resurfaced route.

The improved infrastructure for cyclists, pedestrians and horse-riders is expected to benefit community severance, in particular the introduction or enhancement of crossings and the introduction or widening of shared use paths, cycle lanes and grass verges. The overall severance impact of the scheme has been assessed as **Slight Beneficial**.

3.7.1.6. Journey Quality

Journey quality is generally understood as the cumulative travelling experiences of the quality and ambience of a journey[1]. As recognised in TAG Unit A4-1, it represents a measure of the real and perceived physical and social environment experienced while travelling and includes factors such as perceptions of safety, information provision and comfort. Specifically, journey quality impacts can be sub-divided into three groups:

- Traveller care (cleanliness, level of facilities, information);
- Travellers' views (the view and pleasantness of external surroundings for the duration of the journey); and
- Traveller stress (frustration, fear of accidents and route uncertainty).

The following table presents a high-level qualitative assessment of the scheme in respect to these sub-categories.

[1] Geurs, K. T., Boon, W., & Van Wee, B. (2009). Social impacts of transport: literature review and the state of the practice of transport appraisal in the Netherlands and the United Kingdom. Transport reviews, 29(1), 69-90.

Table 3-11 – Journey quality assessment

Category	Impact assessment
Traveller care	The proposed interventions are expected to improve traveller care factors, resulting in a better user experience for active mode users. Examples of specific measures include the shared use paths and crossings, separated from carriageway for active travel users. It has been shown that providing segregated facilities has a particular strong positive effect in the user's perception. In the literature, results indicate that segregation is needed in order to achieve target levels of increased cycle use. Further to this, the greenway will widen existing paths and provide traffic calming measures, for example junction tightening, sinusoidal traffic humps and raised tables to create a safer environment for pedestrians and cyclists. All these measures are anticipated to contribute to an improved user experience.
Travellers' views	Journey quality is likely to be improved for pedestrians and cyclists using the network. The improvements are expected to deliver benefits to non-motorised users by enhancing pedestrian and cycling infrastructure and improving the connectivity along the corridor. More specifically, the quality and ambience of a journey is expected to be upgraded from the traveller's viewpoint by the active travel interventions. The connectivity will be improved through new and upgrades at existing crossing points benefitting the overall pleasantness of journey for users. Resurfacing is also proposed along sections of the greenway, and new wayfinding will be introduced on the existing guided busway to improve journeys.
Traveller stress	The scheme will provide active mode users with greater route certainty through new and wider shared use paths, and a number of different traffic calming measures along links. It will provide active travel connection with a number of amenities including schools, employers, leisure facilities and transport hubs. Examples of specific measures include: • Traffic calming measures to encourage low speeds including junction tightening, sinusoidal road humps, raised table uncontrolled crossings. • Modified pedestrian and cyclist crossings. • Widening of existing shared use paths and new shared use paths. • New grass verges. • Wayfinding along the busway.

The results of the AMAT indicate a journey quality benefit of £252,980 2010 PVB over the 60-year scheme appraisal period.

The overall journey quality impact of the scheme has been assessed as **Moderate Beneficial**.

3.7.1.7. Option Values and Non-use Values

An option value is the benefit an individual receives from knowing a service exists should they need to use it. A non-use value stems from the knowledge that other people can use the service providing an altruistic benefit.

As indicated in the guidance (TAG unit 4-1), option values and non-use values relate to the implementation or withdrawal of a public transport service and should only be assessed if the scheme includes measures that will substantially change the availability of transport services within the study area. For example, when as part of the scheme the opening or closure of a rail service is being proposed or when public bus services are being introduced, reorganised, or withdrawn. The scheme is not considered to have a significant impact on the availability of transport services.

As there are no changes to any public transport routes or services provided in the area, no significant impacts are anticipated on this regard. Therefore, **no further appraisal is required** for this indicator.

3.7.1.8. Accessibility

Most accessibility barriers relate more to public transport than they do to private vehicles. The provision of the new crossing facilities and enhancements at existing crossings may improve accessibility to bus stops along the corridor.

The greenway is expected to improve connectivity between the rural settlements along the corridor, and accessibility to local services and amenities.

As discussed in the Strategic Case, the St Ives Greenway has and will improve active travel connectivity to the rural settlements along the route. The spurs will connect with the existing busway for enhanced active and sustainable journeys to amenities along it. Key places the St Ives Greenway will improve connectivity and accessibility to include:

- Cambridge City Centre
- North Cambridge rail station
- The Cambridge Science Park
- The Cambridge Regional College
- The Chisolm Trail
- RSPB Fen Drayton Lakes

The greenway will provide direct and safe walking, cycling and horse-riding options for those living in settlements along the greenway, encouraging active travel uptake.

Overall, improvements in accessibility are attributed to the improved walking and cycling access to key employment, transport and leisure sites along the route. Building on this analysis whilst taking into account that the scheme connects with existing provision along the busway and does not propose major improvements or changes to public transport provision or service in the area, the overall impact assessment for accessibility has been appraised as **Slight Beneficial**.

3.7.1.9. Personal Affordability

Monetary costs of travel can be a major barrier to mobility for certain groups of people, impacting their ability to access key destinations. Consideration of personal affordability issues should take place throughout the appraisal process in cases where the following changes occur:

- Parking charges
- Car fuel and non-fuel operating costs (where, for example, rerouting or changes in journey speeds and congestion occur resulting in changes in costs)
- Road user charges
- Public transport fare changes; and
- Public transport concession availability

The St Ives Greenway provides options for modal shift away from private vehicles and public transport to walking and cycling, creating affordability benefits, as people will be able to shift away from other modes towards active travel. The greenway is expected to generate affordability benefits from reduced car fuel and non-fuel operating costs (fuel and non-fuel) as well as decreasing costs of travel (bus fares) for those switching from public transport, as a result introducing new active travel infrastructure and improving existing provision.

Based on the above, the overall impact assessment for personal affordability has been appraised as **Slight Beneficial**. This beneficial assessment is supported by the AMAT assessment, which gives decongestion benefit totalling £27,170.

3.7.2. Distributional Impact Appraisal

3.7.2.1. Methodology

Distributional impacts (DI) relate to the extent to which there are differences in the way impacts affect different groups in society. For example, the noise impacts of an intervention will affect different groups of households, with some experiencing increases, and others experiencing decreases.

This distributional impact appraisal was undertaken in accordance with requirements set out in Transport Appraisal Guidance (TAG) Unit A4-2 published by the Department of Transport (DfT). A proportionate three-step approach has been applied to undertake the analysis – see **Table 3-12.**

Table 3-12 – Overview of the DI process

Step		Description	Output
Screening	**1**	Identification of likely impacts for each indicator	Screening Results
Full appraisal	**2**	Assessment: • Confirmation of the area impacted by the transport intervention (impact area), • Identification of social groups in the impact area (such as transport users, people living in those areas affected by the scheme), • Identification of amenities in the impact area,	DIs social groups statistics and amenities affected within the impact area
	3	Appraisal of impacts: • Core analysis of the impacts (including providing an assessment score for each indicator based on a seven-point scale – large beneficial to large adverse).	Appraisal tables

Source: DfT (2020). TAG unit A4-2 Distributional Impact Appraisal.

The following DI appraisal will consider impacts to vulnerable groups living in proximity to the corridor; in this case a 1km assessment area has been defined as the scheme's impact area to capture characteristics of the local population. The socio-economic, social, and demographic characteristics of social groups in the impact area have been considered against the indicators. Supporting socio-demographic mapping for the study area has been included within Appendix A.

3.7.2.2. Accessibility

In the scheme 1km impact area, the proportion of children and elderly residents is higher than the national average. Children and elderly people are particularly vulnerable to accessibility issues, as are highly deprived households. The impact area has varying levels of affluence/ deprivation, with 1.7% classified within income quintile 1 (20% most deprived LSOAs nationally) and 21.5% in income quintile 2. No Car households are also vulnerable to accessibility impacts as they rely on other transport modes. There are low proportions on No Car households in the impact area of the scheme.

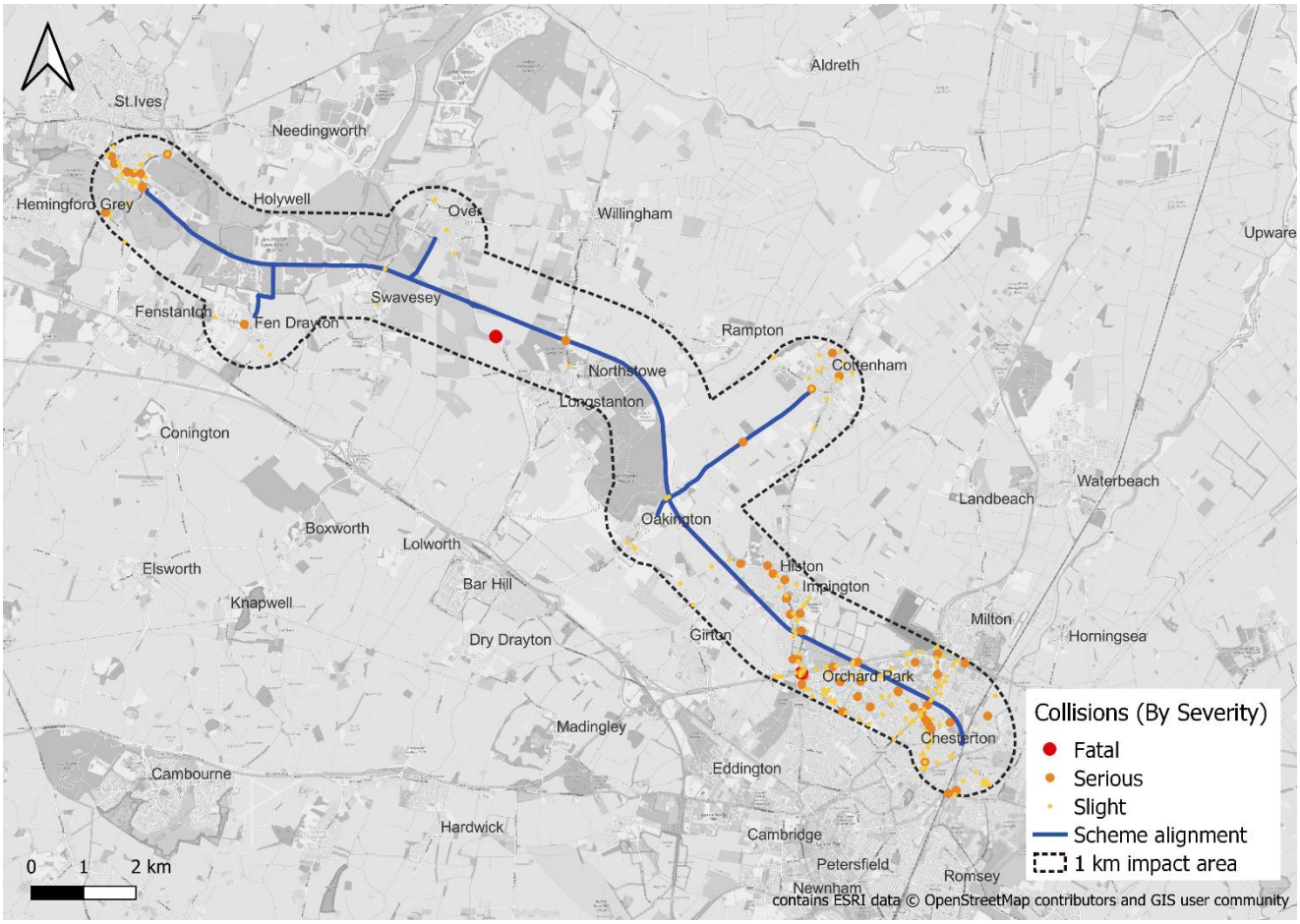
The scheme intends to enhance and introduce active travel measures which will create a safer and better-connected environment for active mode uses and support walking, cycling and horse-riding. The scheme is expected to improve accessibility through improved walking and cycling access to key employment, transport and leisure sites along the route. The overall appraisal for accessibility is considered **Slight Beneficial.**

3.7.2.3. Safety

There was a total of 327 causalities from 283 collisions that occurred within 1km of the scheme between 2016 and 2020. These can be seen on **Figure 3-1**. Notably, the proportion of collisions involving cyclists is over 30%, much higher than the national figure. The proportion of collisions involving pedestrians, motorcyclists, elderly people and children is broadly in line with the national figure, whilst collisions involving young male drivers (between 16 and 24 years) is much higher than it is nationally at 8.3%.

No collisions occurred within the one LSOA clipped by the impact area which are classified within the 20% most deprived LSOAs nationally. The scheme proposes active travel improvements and measures that are expected to benefit the safety of users and vulnerable groups that either live or visit the local area, including the high concentrations of elderly people and children in proximity to the scheme. As such the overall appraisal of safety is **Slight Beneficial**.

Figure 3-3 - Collisions within 1km of scheme alignment (by severity)



3.7.2.4. Air Quality

In the scheme 1 km impact area, the proportion of children is slightly higher than the national average. Children are particularly vulnerable to air quality issues, as are highly deprived households. The impact area is generally very affluent, with only 1.7% households within income quintile 1 (20% most deprived LSOAs nationally). The scheme intends to introduce active travel measures which will create a safer and better-connected environment for active mode users and support sustainable travel. Some of the measures are likely to benefit air quality, including traffic calming measures through the villages, alongside other interventions designed to create a continuous, high-quality and safer active travel network to encourage modal shift from private cars.

Whilst the impact on deprived households is considered neutral due to the low presence of income deprived households in the impact area, the high concentration of children in proximity to the scheme means the overall appraisal for air quality is considered **Slight Beneficial**.

3.7.2.5. Noise

The scheme 1 km impact area has a higher concentration of elderly people within it when compared to the national average for England. The proportion of children is mostly in line with the national average. Older people and children are particularly vulnerable to noise, as are more deprived households. The impact area is generally relatively affluent, with only 1.7% households within income quintile 1 (20% most deprived LSOAs nationally).

The scheme intends to introduce active travel measures which will create a safer and better-connected environment for active mode users and support sustainable travel. Some of the measures are likely to benefit noise, including traffic calming measures through the villages, alongside other interventions designed to create a continuous, high-quality and safer active travel network to encourage modal shift from private cars.

Whilst the impact on deprived households is considered neutral, due to the low presence of income deprived households in the impact area, the higher concentration of children and elderly people in proximity to the scheme means the overall appraisal for noise is considered **Slight Beneficial**.

3.7.2.6. Personal Affordability

A full DI analysis of affordability has not been completed for this scheme due to the unavailability of TUBA results at the time of writing. As it was not deemed necessary to apply findings at such a disaggregated level, this assessment therefore focuses on more aggregated findings and should be used as an indicative assessment. A monetary value is not available for this scheme, therefore, a qualitative comment is applied. This high-level user benefits impact assessment has been conducted to understand how these benefits should be distributed according to the distribution of population per income group.

Income quintile 1 has a small presence across the assessment area, whilst the proportions of the other four quintiles are more in line with the national average 20%. All quintiles are expected to receive net benefits overall as the scheme is expected to instigate some mode shift from car to cycling and walking, as more people choose to walk or cycle rather than drive. The scheme has been assessed as **Slight Beneficial** for this DI appraisal of personal affordability.

3.7.2.7. Security

There are no significant planned changes to public transport waiting/ interchange services as part of this scheme. Similarly, there are no significant changes to pedestrian access beyond new and improved crossings being delivered at various locations. Having said this, the proposed greenway is assumed to have a positive impact on the level of security for transport users to a certain level.

The scheme will provide enhancements to lighting, visibility, and CCTV in areas where lighting is not of good quality. Locations where enhancements might be required have not been confirmed or proposed at this stage.

Based on available information at this stage, a security assessment based on the design element was undertaken as part of the Social Impacts Appraisal. At this stage in the assessment, it is not known how vulnerable groups in terms of security (children, older people, people with a disability and BME) will be impacted. The DI security impacts have not been appraised in this section.

3.7.2.8. Severance

The scheme has been assessed as **Moderate Beneficial** for this DI appraisal of severance. There are high concentrations of vulnerable groups in the impact area (particularly elderly residents and no car households), and it is expected they will benefit from the interventions proposed including new crossing points, segregated shared use routes and traffic calming in locations along the corridor, and hence experience a reduction in both actual and perceived severance.

3.7.2.9. User Benefits

A full DI analysis of user benefits has not been completed for this scheme due to the unavailability of TUBA results at the time of writing. As it was not deemed necessary to apply findings at such a disaggregated level, this assessment therefore focuses on more aggregated findings and should be used as an indicative assessment. A monetary value for User Benefits is not available for this scheme, therefore, a qualitative comment is applied. This high-level user benefits impact assessment has been conducted to understand how these benefits should be distributed according to the distribution of population per income group.

Income quintile 1 has a small presence across the assessment area, whilst the proportions of the other four quintiles are more in line with the national average 20%. All quintiles are expected to receive net benefits overall, as the scheme is expected to instigate some mode shift from car to cycling and walking, as more people choose to walk or cycle rather than drive. The distribution of benefits is indicative solely to be proportional to the overall distribution of population and demonstrates the distribution of benefits for the scheme to be assessed as **Slight Beneficial.** A slight beneficial assessment is expected in the absence of a monetary value for overall user benefits. This should be considered a conservative approach and is based on a hypothetical distribution of user benefits.

3.7.3. Summary of Findings

A summary of findings for the Social Impact Appraisal **(Table 3-13**) and Distributional Impact Appraisal (**Table 3-14**) is outlined below. This provides a final assessment for each indicator as a result of the scheme.

Table 3-13 - Summary of findings from the Social Impact Appraisal.

Social Impact Appraisal indicators	The St Ives Greenway Scheme
Safety	Slight Beneficial
Physical Activity	Moderate Beneficial
Security	Neutral
Severance	Slight Beneficial
Journey Quality	Moderate Beneficial
Option Values and Non-use Values	No assessment required
Accessibility	Slight Beneficial
Personal Affordability	Slight Beneficial

Table 3-14 - Summary of findings from the Distributional Impact Appraisal.

Distributional Impact Appraisal indicators	The St Ives Greenway Scheme
Accessibility	Slight Beneficial
Safety	Slight Beneficial
Air Quality	Slight Beneficial
Noise	Slight Beneficial
Security	No assessment required
Severance	Moderate Beneficial
User Benefits	Slight Beneficial
Affordability	Slight Beneficial

3.8. Other environmental impacts

The scheme is expected to produce mode shift from motorised to active modes, and hence a reduction in motorised vehicle-kilometres. This in turn results in reduced noise, improved local air quality and reduced greenhouse gas impacts (carbon emissions). The monetised benefits from these have been reported in **Table 3-6** above.

Other environmental impacts are assessed qualitatively. These assessments are reported in Appendix B and summarised in **Table 3-15**. The water environment assessments are reported separately for each of the three improved links and for both construction and operation.

Table 3-15 – Environmental impacts

Impact		Assessment
Noise		See AMAT results
Local air quality		See AMAT results
Greenhouse gases		See AMAT results
Landscape		Neutral / slight adverse
Historic environment		Neutral
Biodiversity		Slight adverse
Water environment	Fen Drayton link - construction	Moderate adverse
	Fen Drayton link – operation	Neutral
	Over spur – construction	Moderate adverse (applying water quality, hydromorphology and flood risk mitigation will reduce the assessment score to neutral)
	Over spur – operation	Very large adverse (applying hydromorphology and flood risk mitigation will reduce the assessment score to neutral)

Impact		Assessment
	Oakington-Cottenham – construction	Moderate adverse (applying water quality, hydromorphology and flood risk mitigation will reduce the assessment score to neutral)
	Oakington-Cottenham - operation	Very large adverse (applying hydromorphology and flood risk mitigation will reduce the assessment score to neutral)

3.9. Other qualitative assessments

In addition to the benefits covered in the sections above, some other potential benefits of the greenway schemes have been identified. These are assessed, for this greenway, as follows:

- **Ability to unlock growth:** The greenway is not anticipated as 'unlocking' any individual growth sites. However, it should be seen as part of the overall package of transport measures necessary to deliver sustainable growth in Greater Cambridge, as described in the strategic case within the POC.
- **Ease of interchange with public transport:** The spurs of the scheme connects four villages to the busway: Fen Drayton, Over, Oakington, and Cottenham. Whilst it is currently possible to reach stops on the busway from all of the villages, the routes are not always suitable for cycling or maybe an uncomfortable walk. For example the new spur to Over will improve a muddy path which will give faster access to the busway for much of Over and the Fen Drayton spur will improve a rough and unpleasant surface.

3.10. Costs

The scheme capital costs, and what they include, are described in the financial case. These have been converted to present value costs (PVC) for use in economic appraisal, in accordance with the guidance in TAG unit 1.2.

The PVC has been calculated assuming that the costs of design and construction will be incurred in the year in which the majority of design and construction are scheduled to be undertaken. These dates come from the Milestone Greenways Construction Programme Revision 6. **Table 3-16** shows the costs incurred in each year for each of these sections (where risk/contingency is not included).

Table 3-16 – Costs incurred per year

Year	Busway	Oakington to Cottenham	Over	Fen Drayton	Total
2023	-	-	£89,210	£88,137	**£177,347**
2024	£136,900	£268,193	£874,196	£645,853	**£1,925,142**
2025	-	£2,403,742	-	-	**£2,403,742**
Total	**£136,900**	**£2,671,935**	**£963,406**	**£733,990**	**£4,506,231**

These figures are in base year costs, which is 2023 costs for Oakington to Cottenham and 2022 costs for the other elements.

An annual real cost inflation of 2.1% between the base cost year and the years the costs will be incurred has been applied in accordance with TAG unit A1.2. An optimism bias uplift of 46% has been applied to the base costs. 46% has been chosen rather than the 23% typically used at OBC stage to remain consistent with the OBCs for the Sawston Greenway and Melbourn Greenway. The cost year prices for Fen Drayton, Over, and the Busway wayfinding are Q4 2022, and as Oakington to Cottenham was costed at a later date, the cost year prices are Q1 2023. As such, the PVC for each cost section have been prepared separately using the appropriate base cost year, and then summed to produce the total PVC. The costs have been converted to market prices, deflated and discounted to represent 2010 prices and values. **Table 3-17** shows the PVC for the capital costs.

Table 3-17 – Present value of capital costs

Metric	Busway	Oakington to Cottenham	Over	Fen Drayton
Base Cost Year	2022	2023	2022	2022
Base cost	£136,900	£2,671,935	£963,406	£733,990
Annual real cost inflation applied	2.1% annually			
Base cost total (years incurred prices)	£142,710	£2,779,584	£1,002,381	£763,252
Optimism bias uplift	46%			
Base + OB cost (years incurred prices)	£208,357	£4,058,193	£1,463,476	£1,114,347
Deflated to 2010 prices	£161,721	£3,042,334	£1,135,910	£864,925
Discounted to 2010 values	£99,908	£1,822,202	£703,976	£536,540
Market price conversion factor	1.19			
Present value of costs	£118,891	£2,168,421	£837,732	£638,483
Total PVC				**£3,763,526**

Operational and maintenance costs are not yet confirmed and have not yet been incorporated in the PVC.

Infrastructure maintenance cost savings on the wider highway network, as estimated by the AMATs, also count towards the PVC.

3.11. Appraisal results (core scenario)

Table 3-18 summarises the monetised benefits and costs described above and shows the net present value (NPV) and benefit-cost ratio (BCR).

Table 3-18 – Summary of monetised benefits, costs and BCR (core scenario)

Category	£'000s (2010 prices and values)
Benefits	
Congestion	27.2
Safety benefits – from mode shift (AMAT)	4.2
Safety benefits – from collisions addressed	0
Local air quality	0.6
Noise	0.2
Greenhouse gases	7.0
Reduced risk of premature death	1163.8
Absenteeism	188.3
Journey ambience	253.0
Journey time savings	63.3
Indirect taxation	-8.3
Present value of benefits (PVB)	**1699.4**
Costs	
Infrastructure maintenance saving (negative cost – from AMAT)	-0.6
Investment costs	£3,763.5
Operating costs	0.00
Private sector contributions	0.00
Present value of costs (PVC)	**£3,762.9**
Net present value (NPV)	**-£2,063.5**
Benefit-cost ratio (BCR)	**0.5**

As costs were available for each section of the Scheme, a BCR could be calculated for each portion of the scheme. The results are displayed in **Table 3-19**.

Table 3-19 – Core results split

Section	PVB (£m)	PVC (£m)	NPV (£m)	BCR (£m)
All	**1.7**	**3.8**	**-2.1**	**0.5**
Busway	0.1	0.1	-0.1	0.6
Fen Drayton spur	0.1	0.6	-0.5	0.2
Over spur	1.2	0.8	0.3	1.4
Oakington to Cottenham	0.5	2.2	-1.7	0.2

Appendix C provides the Public Accounts (PA) and Analysis of Monetised Costs and Benefits (AMCB) tables. The Transport Economic Efficiency (TEE) table has not been included as the user benefits were estimated using the DfT's AMAT congestion benefit which does not split the benefits by commuter, business and leisure users.

Appendix D provides the Appraisal Summary Table (AST).

3.12. Sensitivity tests

Sensitivity tests have been carried out to demonstrate the sensitivity of the appraisal results to a range of changes to the inputs.

The sensitivity tests undertaken are:

1. 0% reassignment from Over Road to the Over spur
2. 100% reassignment from Over Road to the Over spur
3. 5% uplift on the busway
4. Higher background growth
5. 30 year appraisal period
6. 20% more cost

The first two tests check the sensitivity of the BCR based on the extremes of reassignment from Over Road to the Over spur, as it is difficult to predict what reassignment will occur. The core scenario assumed a 50% reassignment.

The core scenario assumes, cautiously, that there will be no demand uplift on the busway. It is likely that there may be some small uplift along the busway due to the increased connectivity for some of the villages around it. 5% was chosen as the Cycling and Walking Investment Strategy (CWIS) found that active travel networks surrounding improvements generally received uplifts of between 0.5% and 6%.

The background growth used for the higher background growth sensitivity test was 1.3% annually, in comparison to the 0.75% AMAT default. This was derived from the CSRM2 GCP High Growth Land Use assumptions, as used in the GCP CSRM2 Modelling.

In the core scenario, a 20-year appraisal period was used in line with TAG guidance. A 30-year appraisal period has been included as a sensitivity test. For this scenario it has been assumed that no additional renewal costs are incurred, i.e. that the asset life reaches 30 years rather than 20 before needing renewal.

The 20% more cost test assumes that additional cost is accrued evenly across investment. The PVC (not including infrastructure maintenance saving) has been uplifted by 20% and used against the core scenario benefits.

Table 3-20 shows the results of these tests alongside the Core scenario.

Table 3-20 – Sensitivity tests

Section	PVB (£m)	PVC (£m)	NPV (£m)	BCR (£m)
No Over reassignment	**0.6**	**3.8**	**-3.1**	**0.2**
Over spur only	0.1	0.8	-0.8	0.1
100% Over reassignment	**2.8**	**3.8**	**-1.0**	**0.7**
Over spur only	2.2	0.8	1.4	2.7
5% Busway uplift	**2.2**	**3.8**	**-1.5**	**0.6**
Busway section only	0.1	0.1	0.0	1.1
30 year Appraisal	**2.5**	**3.8**	**-1.2**	**0.7**
Busway section only	0.1	0.1	0.0	0.8
Fen Drayton spur only	0.2	0.6	-0.4	0.3
Over spur only	1.7	0.8	0.9	2.1
Oakington to Cottenham only	0.7	2.2	-1.5	0.3
Higher background growth	**1.8**	**3.8**	**-2.0**	**0.5**
Busway section only	0.1	0.1	-0.1	0.6
Fen Drayton spur only	0.1	0.6	-0.5	0.2
Over spur only	1.2	0.8	0.4	1.5
Oakington to Cottenham only	0.5	2.2	-1.7	0.2

Section	PVB (£m)	PVC (£m)	NPV (£m)	BCR (£m)
20% more cost	**1.7**	**4.5**	**-2.8**	**0.4**
Busway section only	0.1	0.1	-0.1	0.5
Fen Drayton spur only	0.1	0.8	-0.6	0.2
Over spur only	1.2	1.0	0.2	1.2
Oakington to Cottenham only	0.5	2.6	-2.1	0.2

3.13. Value for money statement

The core scenario BCR of 0.5 represents poor value for money (VfM) in terms of the VfM categories set out in the DfT guidance. This should be seen in the context of the inevitable approximations and limitations when appraising schemes such as this one. The low BCR is largely affected by the type of scheme being appraised, where this scheme is primarily focused on building the connectivity between local communities and villages to the already existing busway greenway. The BCR is affected by the low baseline demand to/from these local villages.

The baseline demand in this appraisal takes account of developments in Cottingham (as described in section 3.4.2). It does not explicitly consider any special growth generated by other key sites such as Northstowe or Cambridge Science Park, instead assuming a higher-than-default annual growth rate reflecting Cambridge area growth levels. Considering the key sites explicitly would be unlikely to affect the VfM category.

Sensitivity tests generally show the BCR remaining in the poor VfM category, with most not resulting in significant change. However the test using a 30-year appraisal period showed that the BCR increases to 0.7. The sensitivity test of adding a 5% uplift to the busway flows, where currently the busway flows have been left as baseline demand, shows the total scheme BCR also increasing to 0.6. The other sensitivity test with a higher BCR (0.7) is with 100% reassignment from the Over Road/Station Road junction to the new Over spur. These are still well within the poor VfM category.

BCR alone is not a complete measure of VfM. Non-monetised impacts, differential impacts, and the extent to which the scheme meets local and national strategic objectives are all factors which are not captured in the BCR. The assessment of non-monetised impacts has shown that the scheme has particular benefits to certain disadvantaged or vulnerable groups, particularly those most reliant on walking or cycling. For example, children and elderly people, who may have less access or ability to use other modes of travel.

The social and distributional impacts show the scheme to have beneficial impacts. Of the 14 social and distributional factors which could be appraised, the St Ives Greenway has moderate beneficial impact on 3 factors, and slight beneficial to a further 10. The appraisal found no adverse social or distributional impacts.

The strategic case within the POC has set out the wider policy objectives and transport strategy, and how the Greenways programme supports these. The St Ives Greenway is in line with those objectives, even if its individual contribution is modest. Furthermore, although the appraisal considers the Greenway as a standalone scheme, it can also be seen as part of the broader programme of Greenways and other measures that may together offer broader synergies towards achieving those objectives.

4. Financial case

4.1. Introduction

The financial case sets out the scheme's affordability, funding arrangements and any technical accounting issues.

The outline budgets for each Greenway, and the overall programme funding arrangements, are set out in the POC. The scheme-specific OBCs therefore cover only the following:

- Scheme costs
- Any scheme-specific differences from the generic position given in the POC – eg if a scheme has developer contributions

4.2. Scheme costs

The scheme costs were estimated by Faithful + Gould based on the concept designs. The following allowances and exclusions have been made:

- VAT has been excluded.
- Contaminated material assumed not present.
- Client direct costs including management and finance excluded.
- Land purchase, leasing and compensation excluded.
- Sunk Costs excluded.

GCP recently released guidance for Greenways cost estimates. This was used for Oakington to Cottenham, but not for Fen Drayton and Over schemes. It is likely that once the guidance has been finalised, all schemes may be updated to reflect the guidance. **Table 4-1** displays the two guidance approaches for clarity as to what assumptions are in which scheme.

Table 4-1 – Cost allowance assumptions

Allowances	Oakington to Cottenham spur (new guidance)	Fen Drayton spur	Over spurs
Indirect construction cost (Preliminaries including Traffic Management)	17.5%	20.0%	17.5%
Overheads and profit	7.0%	7.0%	7.0%
Design Fees	12.0%	15.0%	15.0%
Client supervision	6.4%	7.5%	7.5%
Stats and utilities	N/A	N/A	30.0%
Risks/Contingency	10.0%	20.0%	20.0%
Optimism Bias	20.0%	N/A	N/A
Inflation (BCIS TPI)	Included	N/A	N/A
Cost base prices	Q1 2023	Q4 2022	Q4 2022

As discussed below, the risk/contingency, optimism bias and inflation do not correspond to the economic case where 46% has been used for all spurs.

The estimated total cost is £5.93 million. The outturn, allowing for inflation to the date of construction, is forecast to be higher as set out in **Table 4-2**. This can be compared to the £7.50m budget value for the scheme previously set out in the POC.

Operation and maintenance costs have not yet been estimated.

Table 4-2 – Scheme costs (£)

Item	Fen Drayton Link	Over Bridleway Spur	Oakington to Cottenham Spur	Existing St Ives Greenway	Total
Direct Construction Cost					
Series 200 - Site Clearance	£5,687	£5,058	£36,121		£46,866
Series 300 - Fencing			£22,498		
Series 500 - Drainage and Service Ducts	£3,230	£0	£55,780		£59,010
Series 600 - Earthworks	£29,790	£93,224	£554,748		£677,762
Series 700 - Pavements	£390,386	£0	£113,524		£503,910
Series 1100 - Kerbs, Footways and Paved Areas	£12,646	£178,758	£882,250		£1,073,654
Series 1200 - Traffic Signs and Road Markings	£14,531	£5,646	£49,262		£69,439
Series 2500 - Special Structures	£0	£182,070	£29,750		£211,820
Series 3000 - Landscaping and Ecology	£1,341	£8,283	£33,708		£43,332
Total Direct Construction Cost (A)	**£457,611**	**£473,039**	**£1,777,641**		**£2,708,291**
Indirect Construction Cost					
Preliminaries	£68,642	£70,956			£139,598
Traffic Management	£22,881	£11,826			£34,707
Total Indirect Construction Cost (B)	**£91,523**	**£82,782**	**£311,088**		**£485,393**
Total Project Construction Cost (A+B)	**£549,134**	**£555,821**	**£2,088,729**		**£3,193,684**
Overheads and Profit	£38,440	£38,908	£146,212		£223,560
Design fees	£88,137	£89,210	£268,193		£445,540
Client Supervision	£50,679	£51,296	£160,201		£262,176
Stats and utilities		£220,571			£220,571
Risks/ Contingency	£145,278	£191,162	£266,334		£602,774
Optimism Bias			£585,934		£585,934
Inflation (BCIS TPI)			£232,030		£232,030
Total Cost	**£871,668**	**£1,146,968**	**£3,747,633**		**£5,766,269**
Wayfinding Cost Estimates	£7,600	£7,600	£8,600	£136,900	£160,700
Total Cost (including Wayfinding)	**£879,268**	**£1,154,568**	**£3,756,233**	**£136,900**	**£5,926,969**
Total Cost (including Wayfinding) ***Without risk/contingency /optimism bias/inflation***	**£733,990**	**£963,406**	**£2,671,935**	**£136,900**	**£4,506,231**

Note: The contingency line items for financial case purposes are a further contingency allowance and Optimism Bias has not been included in the costs. This Optimism Bias does not necessarily correspond to the Optimism Bias used in the economic case, where 46% has been used.

4.3. Scheme-specific differences from the generic position

No developer contributions have been confirmed for the St Ives Greenway.

No other scheme-specific differences from the generic position set out in the POC have been identified.

5. Commercial case

5.1. Introduction

The commercial case sets out the commercial viability of the proposal and the procurement strategy that will be used.

The POC set out the procurement approach for the Greenways programme. The scheme-specific OBCs therefore only cover any scheme-specific differences from the generic position given in the POC.

5.2. Scheme-specific differences

None have been identified for this scheme.

6. Management case

6.1. Introduction

The management case assesses whether a proposal is deliverable. It tests the proposal's planning, governance structure, risk management, communications and stakeholder management, benefits realisation, and assurance.

The GCP will deliver the St Ives Greenway as part of the Greenways Programme using delegated powers from CCC, although in some areas such as Right of Way restrictions the GCP will rely on the County Council's statutory powers.

Most of the management case is common to the whole programme and is set out in the POC. The scheme-specific OBCs therefore only cover any scheme-specific differences from the generic position given in the POC – for example, involving land agreements, risk profile, the consents strategy, or future ownership of the infrastructure.

6.2. Scheme-specific risks

The main risks for the Greenways programme as a whole were set out in the POC. The main risks specific to this particular scheme are shown in **Table 6-1**.

Table 6-1 – Main scheme-specific risks

Risk	Risk Description	Potential Impact	Risk Mitigation Measures (to be agreed)
Landowner objections	Some sections of the scheme will require the agreement of landowners in order to create new Public Rights of Way	Increases in costs and time required to deliver the scheme. Potential creation orders and involvement of the Planning Inspectorate could lead to an 18-month delay	Early engagement with landowners
CCC staff capacity	Owing to the scope of the overall Greenways programme, CCC staff may not have sufficient capacity to assist with the St Ives Greenway programme	Delays to the programme whilst waiting for CCC staff to become available to assist	Liaise with CCC to ensure the programme takes into account their staff availability to avoid unscheduled delays
Design changes – significant	The final detailed design requires significant changes to be made to the preliminary design that was consulted on, causing breakdown of trust with local residents	Increased likelihood of local opposition occurring, causing reputational damage and poor public relations for CCC Increased cost and programme delays, as design may need to be updated and potentially consultation/engagement re-done	Early engagement with statutory consultees and landowners. Comprehensive surveys to be undertaken. Funding to be confirmed at an early stage, in depth liaison with CCC Highways teams to ensure that all aspects of the design are accepted. Engagement with the Local Liaison Forums (LLF) to explain why changes are necessary

Risk	Risk Description	Potential Impact	Risk Mitigation Measures (to be agreed)
Flooding	The works are located within flood zones	If the scheme is not designed to account for this, there is an increased risk flooding could affect surrounding properties causing reputational damage and poor public relations for CCC. Additionally, flooding during construction would cause delays to the programme	Design of the scheme to take flood risk into account

6.3. Consents

A Planning and Consents Strategy is being developed for the Greenway, setting out the optimal planning and consents approach for each individual section. The St Ives Greenway will likely require a combination of at least some of the following:

- Highways Permitted Development rights – General Powers of improvement – Fen Drayton and the Over Bridleway could be delivered using these;
- Environmental Impact Assessments (EIAs) – an EIA Screening Request will be submitted as standard and if a significant environmental impact is expected (although this seems unlikely at present) an EIA will be completed;
- Section 25 Highways Act 1980 notices – to create Public Rights of Way (PRoW) where there is agreement from a landowner to create the rights for a bridleway;
- Section 26 Highways Act 1980 notices – to create PRoW where there is not agreement from a landowner;
- Consents and permits from the Environment Agency and Internal Drainage Boards (including Swaversey Internal Drainage Board); and
- Swavesey Byeways' Act 1984 – this governs the financial provision for the maintenance of the Swavesey Byeways, thus the committee will need to be consulted.

The key scheme-specific consents issue for this Greenway relates to the creation of new PRoW. It is preferable to obtain these under Section 25 of the Highways Act 1980 as, although it may be possible to obtain a Creation Order under Section 26 of the Highways Act 1980, the latter approach is riskier and not guaranteed to succeed. Consequently landowner objections have been included as an entry in **Table 6-1**.

Appendix A. Socio-demographic mapping

The figures in this annex show each of the vulnerable groups identified for the study area, including the female, children (under 16 years old), elderly (over 70 years old) and DLA claimants. Further income indicators have also been identified for the local population, including households with no car or van and income deprivation.

Figure 6-1 – Female population - Highest 20% Output Areas (OAs) nationally

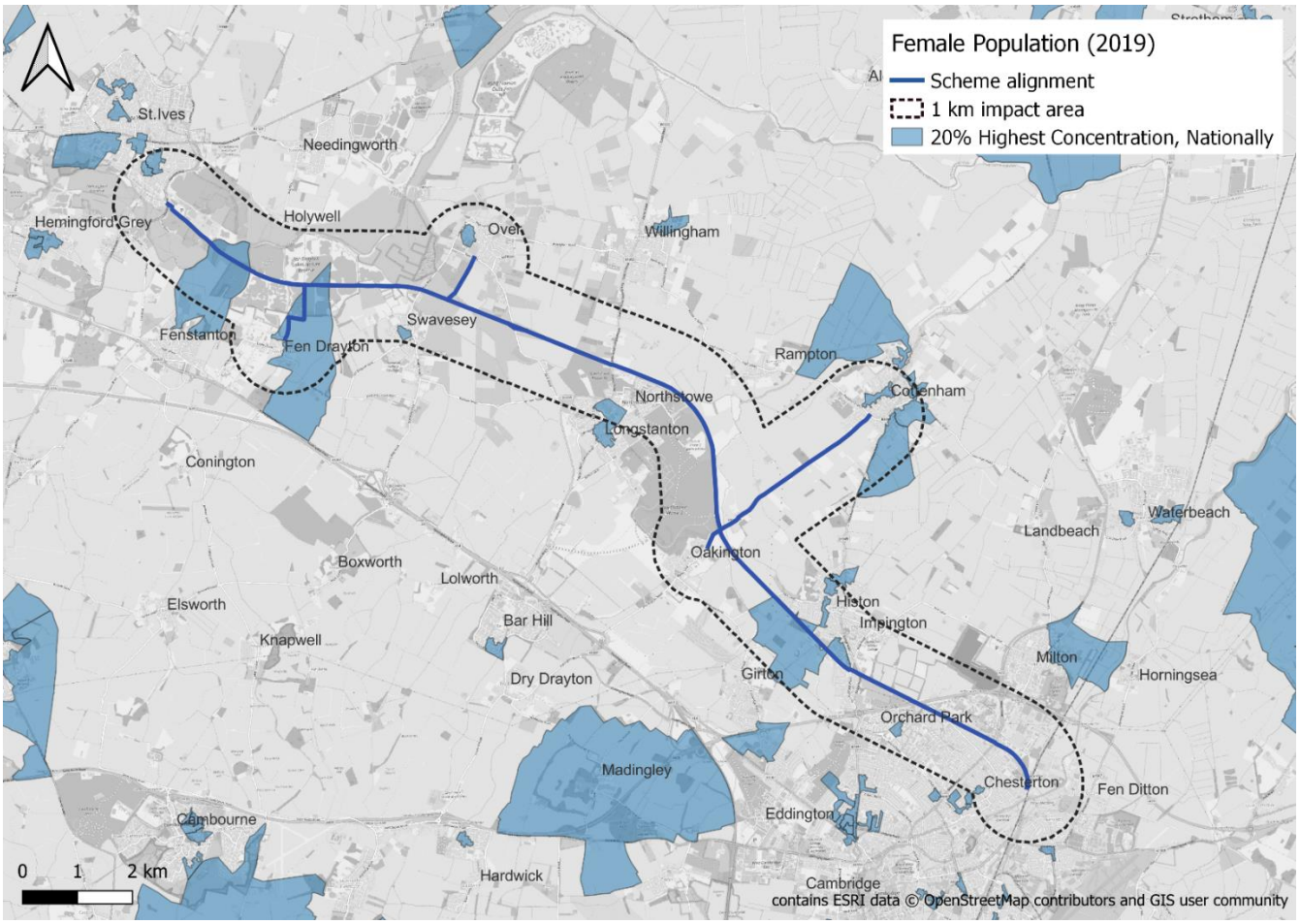


Figure 6-2 – Children (aged 16 and under) population - Highest 20% Output Areas (OAs) nationally

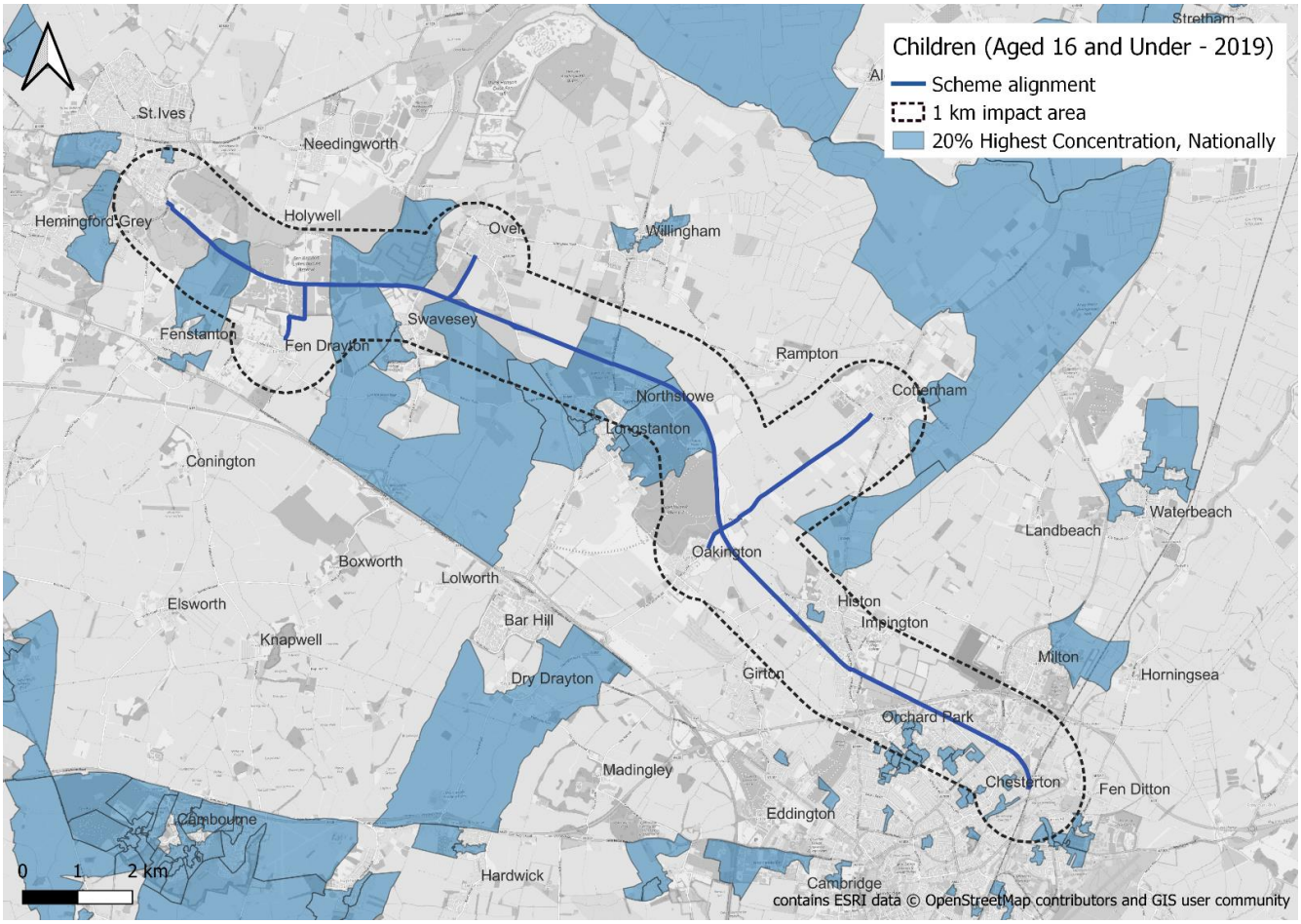


Figure 6-3 – Elderly (aged 70 and over) population - Highest 20% Output Areas (OAs) nationally

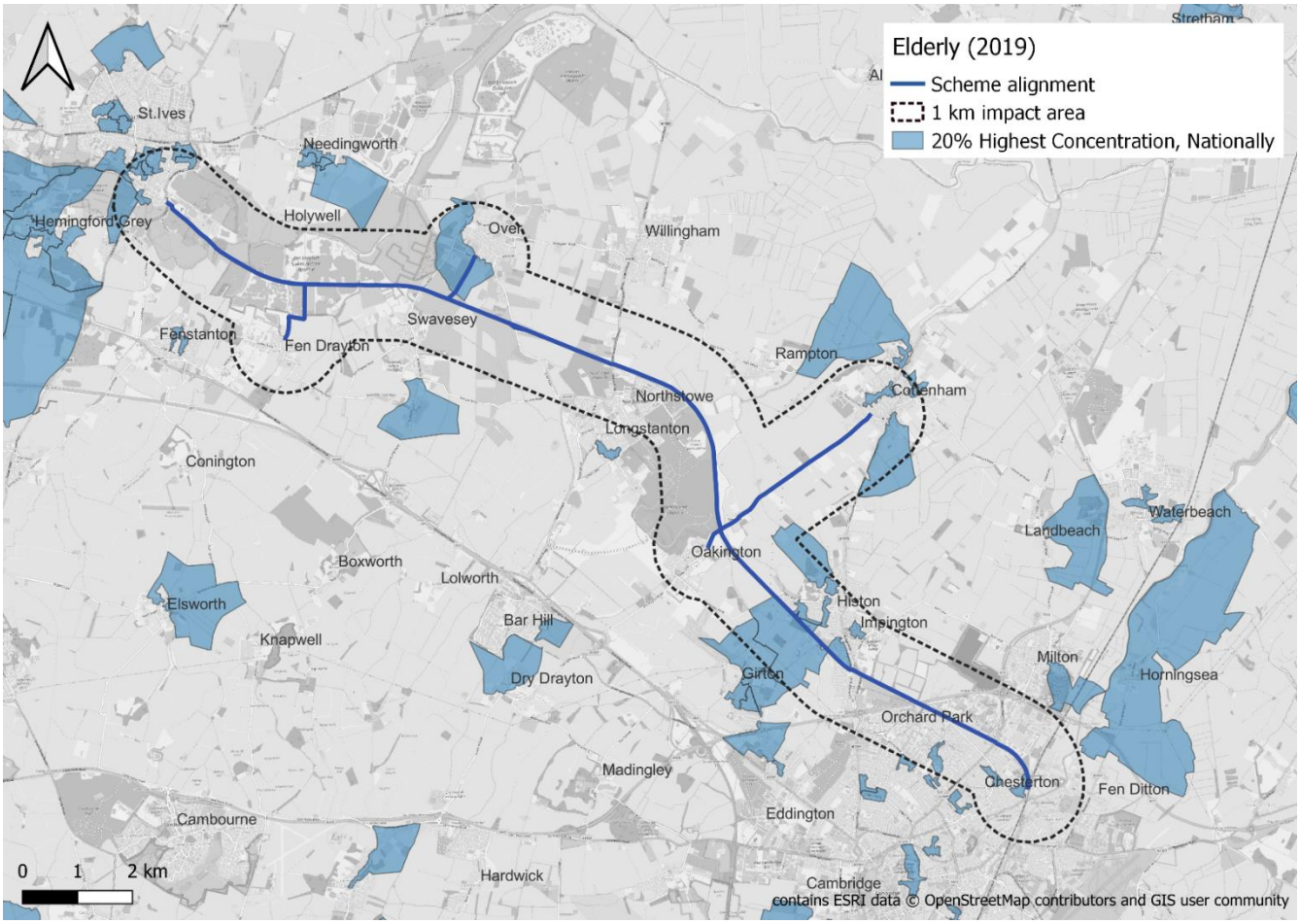


Figure 6-4 – DLA Claimants - Highest 20% Lower Super Output Areas (LSOAs) nationally

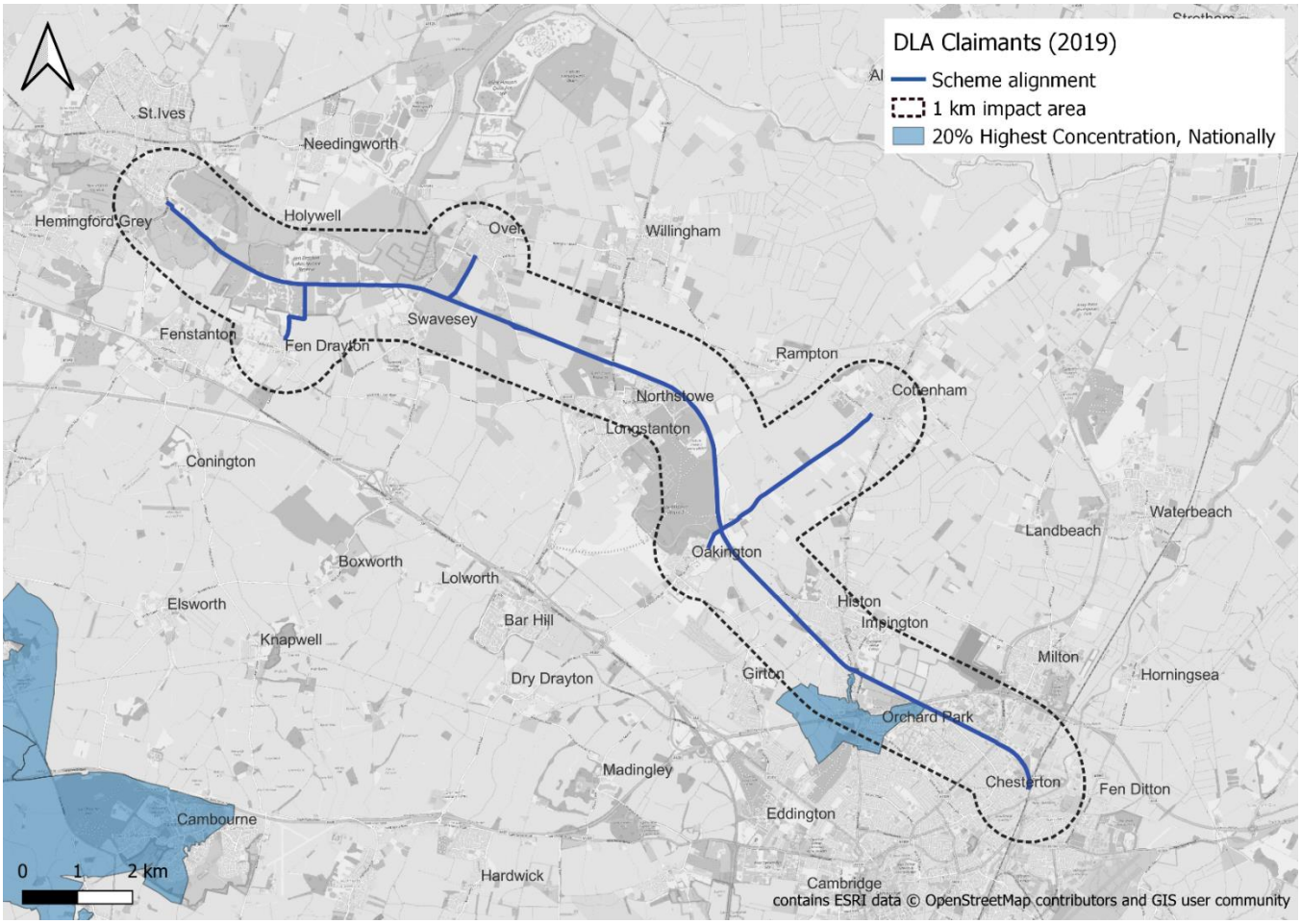


Figure 6-5 - Households with no car/van – Highest 20% Output Areas (OAs) nationally

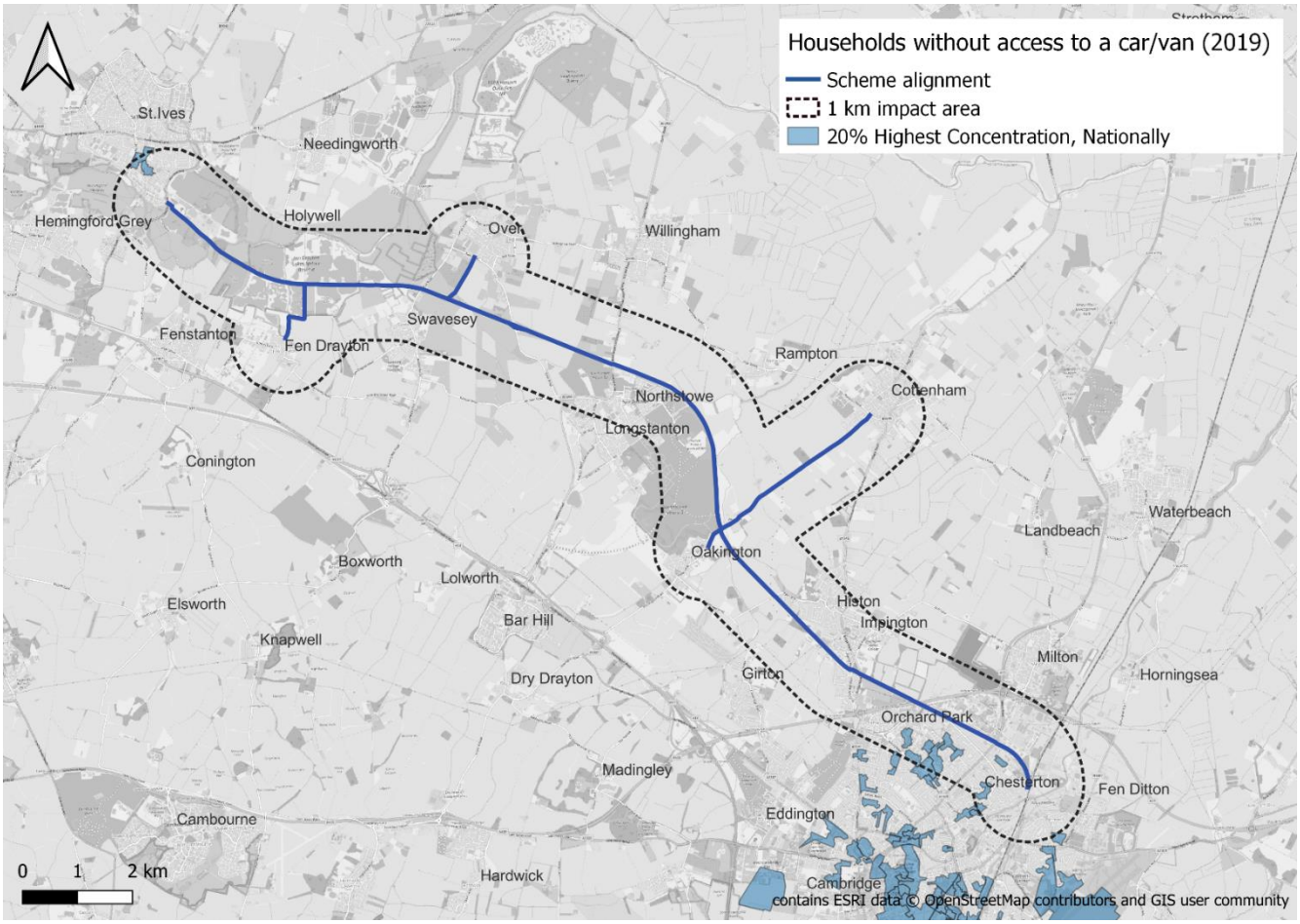
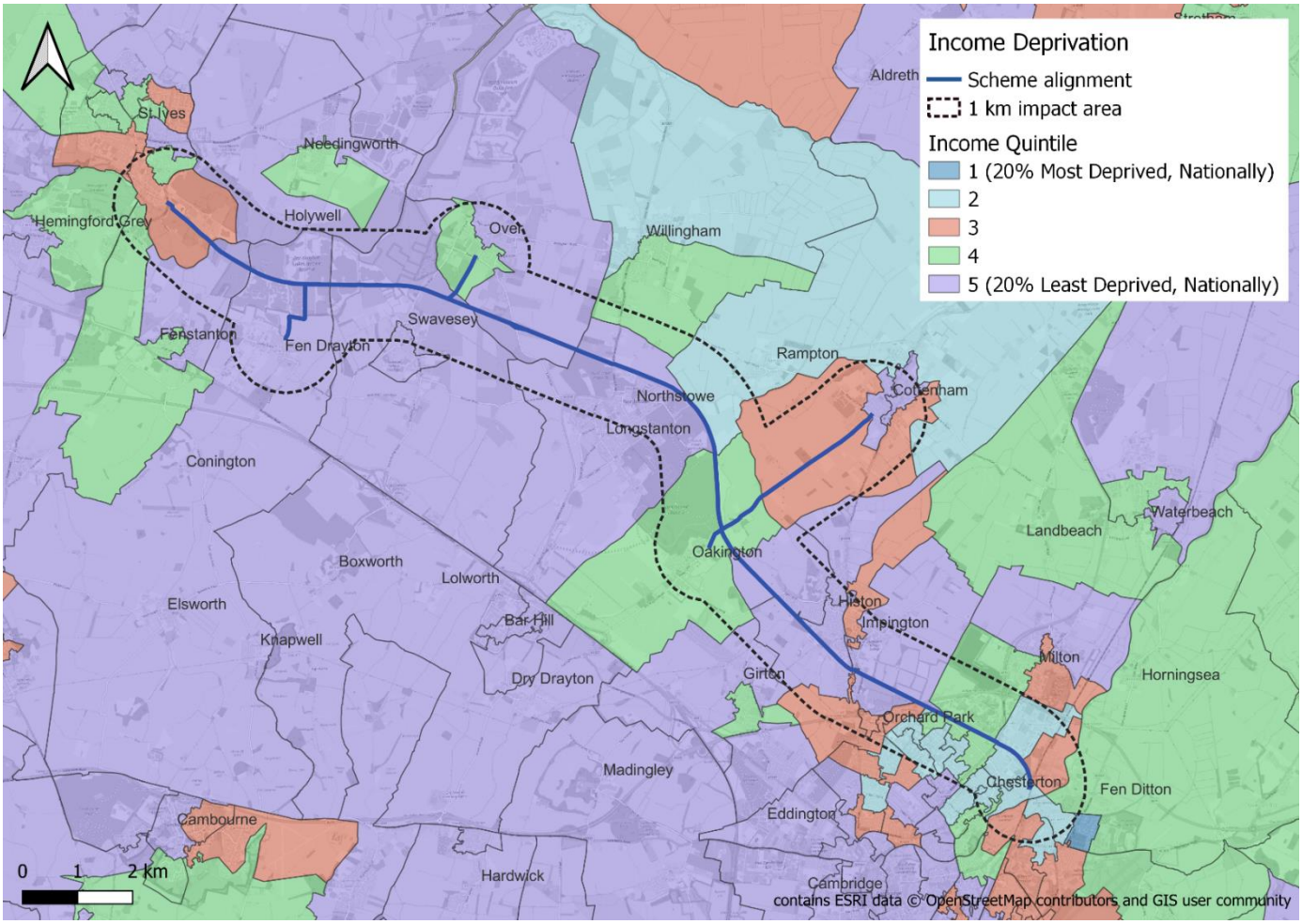


Figure 6-6 –Income Deprivation (LSOAs)



Appendix B. Qualitative environmental assessments

(See following pages)

TAG Biodiversity Impacts Worksheet

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Mare Fen Local Nature Reserve (LNR)	For the purpose of this webTAG assessment, the three "links" leading from the main St Ives Greenway have been assessed: The Fen Drayton Link, the Oakington to Cottenham Link, and the Over Link. The overall biodiversity impact on each area in column B is taken to be the result of the highest impact from each of the links. A search for LNRs within 500 m of the Scheme returned one result. Mare Fen LNR is located approximately 490 m west of the scheme at the Over Link site. The LNR is linked to the Over Link site hydrologically via the Swavesey Drain. The LNR is an area of permanent pasture in the floodplain of the River Great Ouse used for summer grazing for cattle or sheep and is one of few remaining fragments of this habitat, consisting of wet meadows with a mosaic of grassland types, reed fringed ditches and ponds. The water levels are controlled using sluices and overflows. During the winter the sluices are open to allow the fen to flood and closed late spring for grazing. The fen provides ideal habitat for over-wintering waterfowl and wading birds, as well as supporting a range of aquatic plants, invertebrates, amphibians, reptiles and badgers. Mare Fen LNR is beyond 500 m from the Fen Drayton Link and the Oakington to Cottenham Link.	Regional	Regional - supports a mosaic of regionally rare habitats and important species.	Unknown	Medium	Minor negative No direct impacts are anticipated to the LNR due to the distance between the LNR and the scheme. There is a potential for indirect impacts such as pollution events during the construction phase of the scheme. The Over Link site is hydrologically connected to the reserve by Swavesey drain.	Slight adverse
Fen Drayton Gravel Pits County Wildlife Site (CWS)	The CWS covers the northern part of the scheme at the Fen Drayton link site and overlaps with the Fen Drayton Lakes RSPB reserve. It consists of a large gravel pit complex adjacent to the River Great Ouse. The site contains a number of flooded disused pits ranging from small to large and which are in varying stages of colonisation. These support nationally scarce vascular plant species and nationally scarce dragonflies as well as high invertebrate diversity and large numbers of wintering and breeding wetland/wading birds. The CWS is beyond 500 m from the Over Link and the Oakington to Cottenham Link.	Regional	Regional - supports a mosaic of important habitats and nationally scarce species.	Unknown	Medium	Minor negative As the scheme overlaps with the CWS at the Fen Drayton Link Site, there may be direct impacts from noise, vibrations, lighting and human disturbance as well as indirect impacts such as pollution events during the construction phase of the scheme. However, the scheme follows the existing Holywell Ferry Road, a byway open to all traffic which is bounded by drainage ditches and hedgerows with trees, seperating the scheme from the features for which the CWS is designated. There is a potential for indirect impacts such as pollution events during the construction phase of the scheme due to run off events as the CWS surrounds the Fen Drayton Link Site.	Slight adverse
Lowland Fens (Irreplaceable Habitat) (Priority Habitat)	There are 70 parcels of lowland fen habitat as listed on the priority habitat inventory available on MAGIC within 500 m of the Fen Drayton link site, the closest being directly adjacent to the northern half of the Fen Drayton link to both the east and west of the scheme. These areas all fall within the designated Fen Drayton Gravel Pits CWS. This habitat does not fall within 500 m of the Over Link site. This habitat does not fall within 500 m of the Oakington to Cottenham Link site.	Regional	Regional - this is a nationally scarce habitat which is considered irreplaceable, however there are multiple examples within the surrounding landscape.	Unknown	Medium	Minor negative The scheme will not have a direct impact on this habitat. However, areas of this habitat are hydrologically connected to the site via the Oxenholme drain and unnamed drainage ditches at the Fen Drayton Link site. There is a potential for indirect impacts such as pollution events during the construction phase of the scheme.	Slight adverse
Coastal and Floodplain Grazing Marsh (Priority Habitat)	There are two parcels of coastal and floodplain grazing marsh as listed on the priority habitat inventory available on MAGIC within 500 m of the Fen Drayton link site, the closest of which is directly adjacent to the south west of the scheme. There are two parcels of coastal and floodplain grazing marsh as listed on the priority habitat inventory available on MAGIC within 500 m of the Over Link site, the closest of which is 490 m west of the scheme. These are both part of the Mare Fen LNR. This parcel of priority habitat is hydrologically linked to the Over Link site via the Swavesey Drain. There are seven parcels of coastal and floodplain grazing marsh as listed on the priority habitat inventory available on MAGIC within 500 m of the Oakington to Cottenham Link site, the closest of which is directly adjacent to the south of the site.	Local	Local - a priority habitat which is common across Cambridgeshire	Unknown	Low	Minor negative The scheme will not have a direct impact on this habitat. However, areas of this habitat are hydrologically connected to the site via the Oxenholme drain, Swavesey drain and unnamed drainage ditches. There is a potential for indirect impacts such as pollution events during the construction phase of the scheme.	Slight adverse
Deciduous Woodland (Priority Habitat)	There are ten parcels of deciduous woodland as listed on the priority habitat inventory available on MAGIC within 500 m of the Fen Drayton link site, the closest of which is 20 m north of the scheme. There are seven parcels of deciduous woodland as listed on the priority habitat inventory available on MAGIC within 500m of the Over Link site, the closest of which is 150 m east of the scheme. There are 18 parcels of deciduous woodland as listed on the priority habitat inventory available on MAGIC within 500 m of the Oakington to Cottenham Link site, the closest of which are directly adjacent to the site both to the north and south.	Local	Local - considered to be of importance to biodiversity conservation, but common in the wider landscape.	Unknown	Low	Minor negative The scheme will not have a direct impact on this habitat. However, areas of this habitat are hydrologically connected to the site via the Swavesey drain at the Over Link. There is a potential for indirect impacts such as pollution events during the construction phase of the scheme.	Slight adverse
Traditional Orchard (Priority Habitat)	There are 59 parcels of traditional orchard as listed on the priority habitat inventory available on MAGIC within 500m of the Over Link site, the closest of which is directly adjacent to the west of the Scheme. There are 35 parcels of traditional orchard as listed on the priority habitat inventory available on MAGIC within 500 m of the Oakington to Cottenham Link site, the closest of which are directly adjacent to the north and south of the site. There are no parcels of traditional orchard within 500 m of the Fen Drayton Link site.	Local	Local - considered to be of importance to biodiversity conservation, but common in the wider landscape.	Unknown	Low	Minor negative The scheme will not have a direct impact on this habitat. However, areas of this habitat are hydrologically connected to the site via the Swavesey drain at the Over Link site. There is a potential for indirect impacts such as pollution events during the construction phase of the scheme.	Slight adverse

Hedgerows (Priority Habitat)	During the walkover survey at the Fen Drayton Link site, ten hedgerows were identified. This survey was undertaken at a sub-optimal time of year for plant identification, however it is assumed that these hedgerows constitute a priority habitat. Most of these hedgerows are located directly adjacent to the Proposed Scheme on the road verges adjacent to Holywell Ferry Road. There are many further hedgerows within the wider landscape and within 500 m of the Scheme which could not be accessed during the walkover to fully survey to determine whether they constitute a priority habitat. As no surveys have been completed at the Over Link or Oakington to Cottenham Link sites it cannot be determined whether this priority habitat is present within 500 m of the site, but a review of satellite imagery suggests it is likely to be.	Local	Local - considered to be of importance to biodiversity conservation, but common in the wider landscape.	Unknown	Low	Minor negative The scheme will not have a direct impact on this habitat as it is assumed for the purpose of this assessment that no hedgerow vegetation clearance is required. However, areas of this habitat are hydrologically connected to the site via the Swavesey drain. There is a potential for indirect impacts such as pollution events during the construction phase of the scheme.	Slight adverse
Watercourses (ditches and streams)	Oxenholme drain and three unnamed drains/watercourses fall within 500 m of the Fen Drayton Link site. Oxenholme drain passes throught the site. Swavesey drain and four unnamed drains/watercourses fall within 500 m of the Over Link site. Swavesey drain and an unnamed drain pass through the site. Three unnamed drains/watercourses and Public drain/Beck Brook fall within 500 m of the Oakington to Cottenham Link site. Beck Brook passes through the site.	Local	Local - provides habitat to local aquatic and riparian species.	Unknown	Low	Minor negative Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to watercourses due to pollution events during the construction phase.	Slight adverse
Rivers (Priority Habitat)	The River Great Ouse is 1 km north of the Fen Drayton Link site 1.5 km west of the Over Link site, and 4.5 km north of the Oakington to Cottenham Link site. It is hydrologically connected to the Fen Drayton site by Oxenholme drain and the Over site by Swavesey drain, providing a pollution pathway as well as commuting and foraging link for aquatic and riparian species.	Regional	Regional - a large watercourse approximatley 250 km in length, the floodplains of which provide important rare habitats such as that of Mare Fen LNR.	Unknown	Medium	Neutral The River Great Ouse is located a minimum of 1 km from the Scheme at the Fen Drayton and Over Link sites. At such a distance, any pollution events into the Oxenholme Drain or Swavesey Drain will have been diluted, and as such, no negative impacts to the river habitats are anticipated.	Neutral
Ponds (priority habitat)	Ten ponds/lakes fall within 500 m of the Fen Drayton Link site, the closest of which is 30 m west of the site. There is one pond within 500 m of the Over Link site, which is 150 m east of the site. There are nine ponds within 500 m of the Oakington to Cottenham Link site, the closest of which is 50 m north of the site.	Local	Local - provides habitat to local aquatic and riparian species.	Unknown	Low	Minor negative Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to waterbodies due to pollution events during the construction phase.	Slight adverse
Badgers	Cambridgeshire and Peterborough Environmental Records Centre (CPERC) provided no recent badger records within 500 m of the Fen Drayton Link site. The field survey of this site conducted in January 2023 identified suitable habitat for badger sett creation within grass verges, scrub, and nearby woodland habitat but no evidence of badger activity. The majority of the Site is hardstanding, which does not provide suitable habitat for badger sett building. CPERC also provided no recent records of badgers within 500 m of the Over Link site. From a review of aerial imagery, it is noted that badgers could use the hedgerows, arable fields, and traditional orchards for sett building, foraging, and commuting. The deciduous woodland parcels within 500 m of the Scheme likely also provide good habitat for badger sett building. CPERC provided two recent records of badger within 500 m of Oakington to Cottenham Link site. The closest record is an active badger main sett located 120 m north of the Link. From a review of aerial imagery, it is noted that badgers could use the hedgerows, arable fields, and traditional orchards for sett building, foraging, and commuting. The deciduous woodland parcels within 500 m of the Scheme likely also provide good habitat for badger sett building.	Local	Local - the habitats on and surrounding the site likely support badgers of local importance. Badgers are not uncommon within the landscape.	Unknown	Low	Minor negative If vegetation clearance is required, this may limit foraging, commuting or sett building opportunites. Badgers within the sites may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme.	Slight adverse
Bats	CPERC provided 69 recent records of bats within 2 km of the Fen Drayton link site, comprising records of brown long-eared, common pipistrelle, Daubenton's, long-eared bats, Myotis species, Nathusius' pipistrelle, natterer's, noctule, serotine, soprano pipistrelle, pipistrelle species, and unknown bat species. The closest record is an unknown bat species identified flying 210 m west of the Scheme. The closest bat roosting record is a possible serotine roost 1.1 km north of the Scheme. Five trees within the hedgerow bordering the site were identified as having low roosting potential during the field survey. The works are entirely restricted to the hardstanding carriageway with the exception of the removal of the dense scrub, therefore the trees with potential bat roosting features will not be directly impacted by the Proposed Scheme. However, as the works will be within a few metres of the trees with bat roosting potential, there is the possibility that trees could be subject to disturbance impacts. The hedgerow, dense scrub, woodland parcels and ditches within and bordering the site also provide foraging and commuting opportunities. The nearest bat record to the Fen Drayton Link is an unidentified bat sighting in Fen Drayton Lakes RSPB reserve, approximately 220 m to the west. The nearest roost record is a soprano pipistrelle roost in Fen Drayton Primary School, approximately 400 m to the southwest. search on MAGIC for granted European Protected Species applications within 2 km of the Site returned two results. One licence application was granted in 2015 and was in place until 2020 and allows for the destruction of a known soprano pipistrelle roost. A second licence application at the same site was granted in 2017 and is in place until June 2023 and allows for the destruction of a known soprano pipistrelle roost. Both applications are located approximately 1.1 km northwest of the northern extent of the Proposed Scheme. CPERC provided 63 records of bats within 2 km of the Over Link part of the Scheme, comprising records of serotine, Myotis sp., noctule, pipistrelle sp., Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle, long-eared bat species and brown long-eared bat. The closest record is 160 m north of the Over Link and comprises a single pregnant female brown long-eared bat roosting. A search on MAGIC for European Protected Species licence applications within 2 km of the Scheme returned no results for Over link. CPERC provided 56 records of bats within 2 km of the Oakington to Cottenham part of the Scheme, comprising records of common and soprano pipistrelle, brown long-eared bats, noctule, natterer's, Daubenton's and barbastelle bat. The closest record identified is that of a dead common pipistrelle found 10 m north of the Link. The nearest roost record is an unidentified species roost in a residential property, approximately 900 m to the northeast. A search on MAGIC for European Protected Species Licences for bats returned two licenses within 2 km of the Oakington to Cottenham Link site, one covering the destruction of a pipistrelle and soprano pipistrelle resting place from 2011-2012 located 1.6 km north west of the scheme and one covering the destruction of a pipistrelle resting place from 2019-2024 located 475 m north west of the scheme. This indicates the presence of pipistrelle species nearby.	Local	Local - The habitats on and surrounding site likely support bat species of local importance.	Unknown	Low	Minor negative If vegetation clearance is required may impact bat foraging, roosting, and commuting routes. Bats within the Site may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme.	Slight adverse

Otters	CPERC provided no recent records of otter within 500 m of the Scheme at the Fen Drayton Link site. However, the Oxenholme Drain which passes through the site is hydrologically connected to the River Great Ouse, which has been known to support populations of otters. During the field survey, no specific evidence of otters was identified along the Oxenholme Drain and it was considered to have poor suitability. In addition, no vegetation clearance is required adjacent to the drain which means habitats present which could support otters will not be directly disturbed as a result of the works. CPERC provided one recent of otter within 500 m of the Over Link site, located 490 m west of the Link site. This record is of a single otter identified adjacent to the Swavesey Drain. The Swavesey Drain and an unnamed drain at the Over Link site are hydrologically connected to the River Great Ouse, which has been known to support populations of otters. The drains on Site may support commuting otters, and in the absence of field evidence noting the habitats present adjacent to the drains, it is assumed that otters may be able to use the banks of the drains to create holts or other resting sites. CPERC provided no recent records of otter within 500 m of the Oakington to Cottenham site. The drains and Beck Brook at the Oakington to Cottenham Link site may support commuting otters, and in the absence of field evidence noting the habitats present adjacent to the watercourses, it is assumed that otters may be able to use the banks to create holts or other resting sites.	Local	Local - The site may support otters populations of local importance	Unknown	Low	Minor negative Otters within the sites may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme. Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to waterbodies due to pollution events during the construction phase.	Slight adverse
Water voles	CPERC provided no recent records of water vole within 500 m of the Scheme at the Fen Drayton Link site. The stretch of the Oxenholme Drain located within the Survey Area is considered to be largely unsuitable for water voles, as the drain is entirely exposed due to lack of vegetation cover in the channel which would typically provide food and cover. A small number of mammal holes were identified in the eastern bank of the Oxenholme Drain (the bank on the far side from the road); however, there was no vegetation cover and no other signs of water voles. CPERC provided no recent records of water vole within 500 m of the Over Link site. Water voles may be present along Swavesey Drain or the unnamed drain at the Over Link site. Water voles are known to be present at Oakington Brook and Longstanton Brook, close to the site. Longstanton Brook drains into Swavesey Drain, meaning there is direct hydrological connectivity between the site and a known water vole location. In addition, unverified information provided by a landowner local to the site indicates that water voles are present within the Swavesey Drain. CPERC provided no recent records of water vole within 500 m of the Oakinton to Cottenham Link site. The drains and Beck Brook/Public Drain at the Oakington to Cottenham Link site may support water voles, and in the absence of field evidence noting the habitats present adjacent to the watercourses, it is assumed that water voles may be able to use the banks to create burrows.	Local	Local - The site may support water voles of local importance	Unknown	Low	Minor negative If vegetation clearance is required, this may limit foraging, commuting or burrowing opportunites. Water voles within the Site may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme. Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to waterbodies due to pollution events during the construction phase.	Slight adverse
Other Priority Mammals	CPERC did not provide any recent records of other priority mammals within 500 m of the Fen Drayton Link site, however it is likely that this is a result of under-recording rather than absence. No evidence of other priority mammals such as hedgehog or brown hare was recorded during the field survey, however the grassland verge, line of trees, scrub, woodland, and surrounding arable land likely supports habitats for foraging priority mammals. CPERC also did not provide any recent records of other priority mammals within 500 m of the Over Link or Oakington to Cottenham Link sites. Habitats within and adjacent to the Over Link and Oakington to Cottenham Link sites including hedgerows, woodland blocks, arable fields, and traditional orchard could provide suitable commuting and foraging habitat for other priority mammal species such as hedgehog and brown hare.	Local	Local - the site may support priority mammals of local importance	Unknown	Low	Minor negative If vegetation clearance is required, this may limit foraging, commuting or nesting opportunites for many of the priority species Priority species within the sites may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme. Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts waterbodies due to pollution events during the construction phase.	Slight adverse
Breeding and wintering birds	CPERC provided recent records of 657 birds within 500 m of the Fen Drayton Link site. These records include the Schedule 1 bird species barn owl, crossbill, fieldfare, greylag goose, hobby, kingfisher, Mediterranean gull, merlin, peregrine, red kite, redwing, scaup and whimbrel. The Survey Area provides woodland, dense scrub, hedgerows, and grassland habitats that could be used by nesting birds during the breeding season. The Oxenholme Drain is also suitable foraging habitat for birds such as kingfisher, as well as some nesting habitat in adjacent trees and within long grass. The adjacent arable fields and lowland fens provide suitable foraging habitats for wintering birds. The lakes associated with the Fen Drayton Gravel Pits CWS and Fen Drayton Lakes RSPB reserve also provide suitable habitat for wintering birds. During the field survey, the following bird species were identified: swan, cormorant, coot, moorhen, kestrel, and lapwing. According to the RSPB website , the following bird species are regularly recorded within the RSPB reserve: common tern, great crested grebe, gadwall, bullfinch, hobby and lapwing. CPERC provided four recent records of birds within 500 m of the Over Link Site. The closest Schedule 1 bird record to the Over Link is a kingfisher sighting in Swavesey Drain, approximatley 380 m to the southeast. At the Over Link site, trees, hedgerows, traditional orchards, and woodland blocks within or close to Site may support nesting birds during the breeding season. These habitats and the surrounding agricultural fields could provide suitable foraging habitat for wintering bird species. The Mare Fen LNR 490 m west of the site also provides ideal habitat for over-wintering waterfowl and wading birds. CPERC provided 26 records of birds within 500 m of the Oakington to Cottenham Link site. The closest Schedule 1 bird record to the Oakington to Cottenham Link is two barn owl sighting records on the link route. At the Oakington to Cottenham Link site trees, hedgerows, traditional orchards, and woodland blocks within or close to Site may support nesting birds during the breeding season. These habitats and the surrounding agricultural fields could provide suitable foraging habitat for wintering bird species.	Regional	Regional - These species inform part of the designation for the nearby LNR and CWS and therefore may be regionally important	Unknown	Medium	Minor negative If vegetation clearance is required, this may limit foraging, commuting or nesting opportunites for birds and may increase the exposure of habitats regularly used by wintering birds. Birds within the sites may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme. Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to waterbodies due to pollution events during the construction phase.	Slight adverse

Reptiles	CPERC provided two recent records of reptiles within 500 m of the Fen Drayton Link site. One record is of a grass snake on the guided busway approximately 150 m west of the Proposed Scheme, and one record is of a common lizard on a log pile approximately 500 m northeast of the Proposed Scheme. Hedgerows, scrub, the base of large trees, lowland fen, arable field margins, and the woodland blocks could provide suitable habitats for foraging, hibernating, and basking widespread species of reptiles (common lizard, grass snake, adder, and slow worm). In addition, Oxenholme Drain could be used as habitat by grass snake populations. The modified grassland road verge habitats are mown to a short height, therefore there is limited potential for this habitat to support reptiles. The remainder of the site consists of hardstanding which is unsuitable as habitat, apart from potential for at most occasional use by basking reptiles only. CPERC provided one recent record of a reptile within 500 m of the Over Link site. This is a grass snake sighting approximately 500 m to the northwest, in a residential garden. CPERC provided no recent records of reptiles within 500 m of the Oakington to Cottenham Link sites. At the Over Link and Oakington to Cottenham Link sites hedgerows, the base of large trees, woodland blocks, and traditional orchards could provide suitable habitats for foraging, hibernating, and basking by widespread species of reptiles (common lizard, grass snake, adder, slow worm). In addition, the unnamed drains, Swavesey Drain and Beck Brook/Public Drain could be used by grass snake populations.	Local	Local - the Scheme may support reptile populations of a local importance	Unknown	Low	Minor negative If vegetation clearance is required, this may directly kill or injure reptiles or limit reptile foraging and commuting opportunites and remove potential refugia and hibernacula. Reptiles within the Site may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme. Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to waterbodies due to pollution events during the construction phase. This may limit the suitability of aquatic habitats to support grass snake populations.	Slight adverse
Amphibians	CPERC provided no recent records of amphibians within 500 m of the Fen Drayton Link site and a search on MAGIC returned no results for granted European Protected Species licence applications within 500 m. In addition, a search for great crested newt class licence returns gave no results. Oxenholme drain, three further drains/watercourses and ten ponds/lakes fall within 500 m of the site. It is not considered that the lakes associated with Fen Drayton Gravel Pits CWS/ Fen Drayton Lakes RSPB reserve provide suitable breeding habitat for amphibians including great crested newts as they support fish. In addition, the Oxenholme Drain is a flowing watercourse which means it does not provide suitable habitat for breeding amphibians. Hedgerows, trees, dense scrub, and woodland blocks provide suitable terrestrial habitat for amphibians including great crested newts. CPERC provided four recent records of great crested newt (GCN) within 500 m of the Over Link site. The closest amphibian record to the Over Link is a great crested newt record located approximately 216 m to the northwest.There are five drains and one pond within 500 m of the Over link site which could support populations of breeding amphibians. Two of these drains are within the Site. A search on MAGIC for great crested newt class survey licence returns returned two results, both indicating great crested newts are present within the local area. Both these licence return dates are from 2014 and the closest of which is 50 m east of the Scheme. Hedgerows, trees, woodland blocks, and traditional orchard within and adjacent to Site could support suitable terrestrial habitat for amphibian species. There is suitable connectivity between the pond and drains and these terrestrial habitats, meaning that amphibians breeding within these aquatic habitats could easily travel to the terrestrial habitats within or adjacent to the site. CPERC provided no recent records of amphibians within 500 m of the Oakington to Cottenham Link site. There are three drains and nine ponds within 500 m of the Oakington to Cottenham Link site. A search on MAGIC for great crested newt class survey licence returns returned no results. Hedgerows, trees, woodland blocks, and traditional orchard within and adjacent to Site could support suitable terrestrial habitat for amphibian species. There is suitable connectivity between the pond and drains and these terrestrial habitats, meaning that amphibians breeding within these aquatic habitats could easily travel to the terrestrial habitats within or adjacent to the site.	Local	Local - The site may support amphibian populations of a local importance.	Unknown	Low	Minor negative If vegetation clearance is required, this may limit foraging and commuting opportunites for amphibians and remove potential refugia and hibernacula. Protected species within the Site may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme. Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to waterbodies due to pollution events during the construction phase. This may limit the suitability of these aquatic habitats to support amphibian populations.	Slight adverse
White-clawed Crayfish	CPERC provided no recent records of white-clawed crayfish within 500 m of the Fen Drayton Link site. The stretch of the Oxenholme Drain which is located adjacent to Site is considered to be unsuitable for white-clawed crayfish as the substrate within the watercourse comprises silt, sand, and fine gravel which could clog the gills of white-clawed crayfish. There are no large rocks or boulders which could provide suitable refuges for white-clawed crayfish. CPERC also provided no records of white-clawed crayfish within 500 m of the Over Link and the Oakington to Cottenham Link sites. In the absence of field survey and desk study data, it is assumed that the Swavesey Drain, Beck Brook/Public Drain and the unnamed drains at the Over Link and Oakington to Cottenham Link sites could support populations of white-clawed crayfish. Water quality in the Swavesey Drain has been assessed as being good and white-clawed crayfish require the water to be of good quality with low levels of sediment for populations to survive.	Local	Local - the site may support populations of white-clawed crayfish of a local importance.	Unknown	Low	Minor negative White-clawed Crayfish within the Site may be subject to disturbance impacts such as lighting, noise and vibration during the construction phase of the scheme. Although no aquatic habitat is being directly affected by the proposed scheme there is potential for indirect impacts to waterbodies due to pollution events during the construction phase. This may limit the suitability of watercourses to support white clawed crayfish.	Slight adverse

Reference Sources

Multi-Agency Geographic Information for the Countryside (MAGIC) website (https://magic.defra.gov.uk/MagicMap.aspx), Bing Maps (https://www.bing.com/maps), Google Earth (https://earth.google.com/web/), Woodland Trust Ancient Tree Inventory (https://ati.woodlandtrust.org.uk/), Ordnance Survey maps, Buglife Important Invertebrate Areas (https://www.buglife.org.uk/our-work/important-invertebrate-areas/), Plantlife - Important Plant Areas (https://www.plantlife.org.uk/uk/nature-reserves-important-plant-areas/important-plant-areas), Extended UKHab habitat survey (Fen Drayton Link only)

Summary Assessment Score

Slight adverse

Qualitative Comments

The summary score of slight adverse is based on there being no mitigation in place for any of the areas or species identified in column B. Slight adverse impacts are anticipated to all receptors identified, with the exception of Rivers, which are thought to experience a neutral impact as a result of the Scheme. It is thought that with mitigation as outlined within the preliminary ecological appraisal for Fen Drayton link such as the implementation of a precautionary method of working impacts on ecological receptors will be minimised.

TAG Historic Environment Impacts Worksheet

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	This assessment considers the Scheme and a study area of 250m. The Scheme is divided into three sections representing new spurs along the existing St Ives Greenway at Fen Drayton, Over and Oakington-Cottenham. At Fen Drayton, the Scheme will involve the resurfacing of an existing road to make it suitable for cyclists. At Over, the route will formalise an exist bridleway as a cycle path and for the Oakington-Cottenham link, the route will run only existing roads. The landscape is largely characterised by a mixture of urban and agricultural characters with dispersed small settlements. The historic environment within a 250m study area comprises nine scheduled monuments, two grade II* and 23 grade II listed buildings. The Scheme red line boundary falls into the Fen Drayton Conservation Area. The Historic Environment Record was not obtained for this work so an assessment of archaeological potential has not been made however, published sources show that there is a rich potential for prehistoric, Roman and medieval archaeology including barrow cemeteries and Bronze Age settlement and field systems, Roman earthworks and medieval ditches. Thus, the potential should be considered generally high.	The listed buildings and conservation area are of national importance and are protected at a national level. The non-designated archaeological features and remains including the areas of archaeological importance matter at a regional or local level.	The conservation area and grade II listed buildings are of medium significance, the grade II* buildings are of high significance. The significance of the assets reside in their historical, communal and evidential value. The non-designated archaeological remains are of medium and low significance. The significance of the archaeological remains lies in their evidential value. Given the multi-period archaeological potential, the landscape has some historic value.	The historic environment as a whole in the study area is relatively diverse with a variety of different types of historic buildings, some of which are types that display variety. Medieval and post-medieval domestic, agricultural and religious building are relatively common both at a regional and national level, examples are well represented in the designated assets list. Nationally, post-medieval domestic, religious and civil buildings are a diverse class that are constructed in a variety of styles and forms and this variation is represented in the study area.	The area of the Scheme is within a varied landscape. There is likely to be very limited impacts to archaeological remains as the Scheme will largely follow the line of the existing connections. The new link at Over will require further evaluation to assess the potential for archaeology uncovered as a result of the formalisation of the bridleway as a cycle path. For the rest of the Scheme, only limited infrastructure will be built to accommodate and therefore the potential for significant effects on hitherto unknown archaeological remains is considered to be low due to the limited land take required for this Scheme. The Scheme may have adverse impacts upon non-designated assets, but this cannot be quantified at this point. Due to nature of the Scheme largely being an extension of an existing route and utilisation of roads, is it not expected that the listed buildings will experience impact or a change in setting.
Survival	Good to Poor. Though the historic landscape as a whole has been degraded through urban development, a number of individual assets maintain a good level of survival especially the listed buildings. The state of survival of the non-designated archaeological remains is not currently known - it is advised that this is assessed at further assessment through consultation with the Local Planning Authority Archaeologist. The wider historic agricultural landscape has been degraded and its survival is threatened by continued development.	Generally, the survival of conservation areas and listed buildings matters on a regional to national scale. The survival of non-designated heritage assets mainly matters on a local to regional scale, however, there are exceptions where non-designated assets could be considered as important on a national scale if deemed to be of high value.	The survival of the listed buildings is important to understand the development of the villages and towns on the route and their use from the medieval to the modern period. The survival of yet unknown archaeology is important to understand the utilisation and development of a multi-phase landscape from the prehistoric period onwards.	The survival of the historic environment associated with the the Scheme is considered to be common.	

Condition	Of the known assets, an assessment of condition is beyond the scope of this report. The condition of unknown assets or of undesignated assets is beyond the scope of this exercise.	The condition of the listed buildings and conservation area matters on a regional to national scale. The condition of non-designated heritage assets mainly matters on a local to regional scale, however, there are exceptions where non-designated assets could be considered as being of importance on a national scale if deemed to be of high value.	Overall condition of the cultural heritage landscape is of moderate significance. Condition of buried archaeological remains is of indeterminate significance	The condition of the historic environment associated with the Scheme is considered to be common.	
Complexity	The historic environment in the study area is complex. The designated assets demonstrate activity within the area across multiple periods with the listed buildings consisting of domestic, religious and agricultural characters. Any archaeological remains would give evidence of the evolution of use of this landscape over subsequent periods.	The complexity of listed buildings matters on a regional to national scale. The complexity of archaeological remains mainly matters on a local to regional scale, however, there are exceptions where archaeology could be considered as being of importance on a national scale if deemed to be of high value.	The complexity of the designated and non-designated heritage assets is not of national significance.	The complexity of the historic environment associated with the Scheme is considered to be common.	
Context	The Scheme passes through a landscape that is largely characterised by a mixture of agricultural and rural settlement characters. The domestic, religious and agricultural listed buildings are set within the historic core of the towns of Over, Fen Drayton, Cottenham and Oakington.	Generally, the context of listed buildings matters on a regional to national scale. For the context of non-designated heritage assets mainly matters on a local to regional scale, however, there are exceptions where non-designated assets could be considered as being of importance on a national scale if deemed to be of high value.	At this stage it is considered that the context of the designated and non-designated heritage assets is not considered to be of local and regional significance as it is not uncommon and features the usual levels of development, rural landscape and public infrastruture that one would expect.	The context of the Scheme is common both nationally and regionally.	
Period	The designated assets date from multiple periods. The listed buildings date to the medieval and post-medieval periods.	The periods captured by the assets matter on local to regional scales.	At this stage it is considered that the period of the designated and any archaeological remains is of low significance.	Medieval and post-medieval domestic, religious and agricultural listed buildings are generally well represented heritage assets.	

Reference Sources

The National Heritage List for England. Local authority information relating to conservation areas and non-designated heritage assets.

Step 5 - Summary Assessment Score

The overall effect on the historic environment resource is considered to be neutral.

Qualitative Comments

As the Scheme will predominantly be an extension and modification to the exisiting bridleway and road, no sustantial adverse settings impacts to designated heritage assets are anticipated. The installation of the greenway could mean potential for as yet unknown archaeology particularly in the location of the Over link bridleway which should be mitigated for during construction.

TAG Landscape Impacts Worksheet

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The sites are located in countryside to the north of Cambridge. The landform is low lying and flat mostly comprising arable fields bounded by low hedgerows. At Fen Drayton there are several flooded gravel pits.	Scale matters at a local level	This is a fairly commonplace landscape in Cambridgeshire	Important at a local level	This pattern could be easily substituted	The schemes would have minimal impact on the landscape pattern.
Tranquillity	The agricultural landscape is generally quite tranquil with disturbance coming from minor roads.	Tranquility mtters at a local level	This level of tranquilty is found throughout much of Cambridgeshire	Tranquility is important for local people	Tranquility is hard to replace	The schemes would have limited impact on tranquility
Cultural	The schemes arise in or link small settlements based around historic cores with some listed buildings.	The cultural aspects of the area matter locally	The cultural heritage of the area is common place	Importsnt at a local level	Cultural features are impossible to replace	Little effect on cultural aspects
Landcover	Landcover is predominantly arable agriculture with low hedgerows. There are occasional small blocks of woodland and roadside tree groups whilst there is an area of fruit trees by the Over link.	The landcover is important locally	Landcover is typical of this area and not rare	Landcover is important in the landscape locally	The type of landcover features could be easily substitued over time	Schemes are designed to retain landcover and further minor design modifications could avoid most impacts
Summary of character	This is a predominantly arable agricultural landscape. It is low lying and intensively farmed with scattered settlements and individual houses.					

Reference Sources

Natural England, NCA 88 Bedfordshire and Cambridgeshire Claylands

Step 5 - Summary Assessment Score

Neutral/Slight Adverse

Qualitative Comments

The three schemes are located in typical Cambridgshire landscape and could be accomodated with minimal impact.

TAG Water Environment Impacts Worksheet - Over (construction)

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Possible Measures	Assessment data availability	Scale	Rarity	Substitutability	Importance	Without mitigation: Magnitude	Without mitigation: Significance	Resource assessment score without mitigation
Study area:												
Potential Impacts:												
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). Potential for impacts to hydromorphology resulting from the replacement of the existing bridge with a new bridge. Potential impacts include loss of vegetation, mobilisation of sediment and damage to banks. Best practice mitigation measures will be implemented during construction to ensure that any works in close proximity to any watercourses will not result in deterioration to channel planform and vegetation. Sediment management plans will be implemented to mitigate mobilisation of any sediments. At waterbody scale these impact would not be significant.	Swavesey Drain (Main Reach) WFD reported reach: Yes Swavesey Drain (GB105033042770)	Water supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slightly adverse	Insignificant	
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slightly adverse	Insignificant	
			Conservation value of river corridor	Presence of designations (e.g. SSSI, NNR, LNR, SINCs)	Mare Fen LNR is hydrologically connected to Swavesey Drain (main reach).	Regional	Commonplace	Replaceable	High	Slightly adverse	Low Significance	
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Mare Fen watercourse WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)	Water supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slightly adverse	Insignificant	
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slightly adverse	Insignificant	
			Conservation value of river corridor	Presence of designations (e.g. SSSI, NNR, LNR, SINCs)	Mare Fen LNR is hydrologically connected to Mare Fen watercourse.	Regional	Commonplace	Replaceable	High	Slightly adverse	Low Significance	
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). It is assumed the proposed works will not impact the alignment of this watercourse. However, due to the close proximity of the construction works to the watercourse there are potential impacts to hydromorphology e.g. through the increase of sediment in surface water runoff, damage to riparian vegetation, river banks or bed which may alter the morphological functioning of the channel. This impact can likely be mitigated by ensuring sediment management measures are	Unnamed tributary of Swavesey Drain WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)	Water supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slightly adverse	Insignificant	**Slight adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slightly adverse	Insignificant	
No impacts anticipated - located on the periphery of the 1km study area, upstream of the Scheme.	Swavesey Drain (Cow Fen reach) WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts anticipated - located on the periphery of the 1km study area.	Swavesey Drain (Mare Fen reach) WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts anticipated - located on the periphery of the 1km study area.	New Dock watercourse WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts anticipated - located on the periphery of the 1km study area.	Cow Fen watercourse WFD reported reach: Yes Swavesey Drain (GB105033042770)											

Potential for construction activities associated with creating a crossing of the Swavesey Drain, including the creation of embankments within the floodplain or any abutments within the channel or on the river banks, to cause an increase in flood risk by reducing the capacity of the channel or floodplain. These construction works may also alter the nature of flooding either temporarily or permanently, by creating new flow pathways thus increasing flood risk. Potential increase in flood risk, both to the Scheme and surrounding land uses arising from: the storage of materials or temporary changes in topography and earthworks reducing floodplain capacity or impeding flood flow routes, an increase in temporary impermeable areas at site compounds increasing rainfall runoff and discharge of abstracted water (used in construction processes). This impact can likely be mitigated. Mitigation measures could include: - Developing a drainage strategy to address the management of surface waters to ensure flood risk to the surrounding area is not increased. - Developing Flood Management Plans to ensure the proposed construction site can be safely operated and will not be affected in the event of a flood, where floodplain working to be minimised as far as possible; - Ensuring temporary land-take for construction include adequate areas of land set aside for robust flood control measures, for example sustainable drainage control; - Ensuring temporary flood compensation areas are put in place in advance of any earthworks resulting in loss of floodplain.	Swavesey Drain (including the Main Reach, Mare Fen Reach and Cow Fen Reach) floodplain and associated tributaries of the Swavesey Drain	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	Flood Zones 2 and 3 are associated with the watercourse. A section of the Scheme (between the Guided Busway and approximately 80m north east of Swavesey Drain) is located within Flood Zones 2 and 3.	Local	Commonplace	Limited to substitution	Very High	Moderate adverse	Highly Significant	**Large adverse**
			Surface water flooding	Location of surface water flooding	A section of the Scheme (located around Swavesey Drain (Main Reach)) is located within an area at risk of surface water flooding. Also a section at the northern end of the Scheme is located in an area at risk of surface water flooding.	Local	Commonplace	Limited to substitution	Very High	Moderate adverse	Highly Significant	
Potential for deterioration in groundwater quality resulting from construction activities e.g. spillages of fuels and other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Secondary A superficial drift aquifer	Water supply	Groundwater vulnerability	Classification of aquifer vulnerability	The Scheme is partly underlain by Secondary A superficial drift aquifer.	Local	Rare	Limited to substitution	High	Slight adverse	Low Significance	**Slight adverse**
Potential for deterioration in groundwater quality resulting from construction activities e.g. spillages of fuels and other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Secondary (undifferentiated) superficial drift aquifer	Water supply	Groundwater vulnerability	Classification of aquifer vulnerability	The Scheme is partly underlain by Secondary (undifferentiated) superficial drift aquifer.	Local	Rare	Limited to substitution	High	Slight adverse	Low Significance	

Reference Sources

Environmental datasets held on Defra's MAGIC website https://magic.defra.gov.uk/home.htm
Environment Agency - Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/
British Geological Survey's Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html
Surface water flooding areas - https://check-long-term-flood-risk.service.gov.uk/map
Route Alignment - \\wsatkins.com\project\GBPEB\Water\WENV\Projects\St Ives Greenway\7 WIP\Water environment\Proposed works\Over Bridleway\WIP\WIP-Worksheet

Summary Assessment Score (Post mitigation)

Moderate adverse

Qualitative Comments

The general construction activities associated with the Scheme could potentially result in the deterioration of the water quality of the Swavesey Drain, Mare Fen watercourse and an unnamed tributary of Swavesey Drain through spillages of fuels or other contaminating liquids from construction activities. However, this impact can be mitigated through adopting good working practices. Although now withdrawn by the Environment Agency the Pollution Prevention Guidelines still detail good practice advice for undertaking work which may have the potential to result in water pollution. The CIRIA guidance C648, 'Control of Water Pollution from Linear Construction Sites' also provides good advice. This impact also applies to groundwater.

There are potential for impacts to the hydromorphology of Swavesey Drain resulting from the replacement of the existing bridge with a new bridge. Potential impacts include loss of vegetation, mobilisation of sediment and damage to banks. By following best practice mitigation measures is likely to ensure that any works in close proximity to any watercourses will not result in deterioration to channel planform and vegetation. Sediment management plans should be implemented to mitigate mobilisation of any sediments.

There is the potential that construction activities could cause an increase in flood risk to the Scheme itself and surrounding land uses through temporary site compounds for example but this can be mitigated through good working practices including minimising floodplain working and locating compounds outside of the Flood Zones 2 and 3 as far as possible.

It has been assumed that the Scheme will not require any major below ground works (e.g. retaining walls) and therefore no impacts on groundwater levels and flows are anticipated.

As there are potential impacts which are highly significant, the overall assessment score for the construction of the Scheme is large adverse. This has been determined with reference to sections 5.3.15 – 5.3.20 and 10.2 of TAG UNIT A3 - Environmental Impact Appraisal, May 2019, Department for Transport, Transport Analysis Guidance, as summarised below:
• Third most adverse category. The scheme as a whole is assessed according to the most adverse assessment of the features affected i.e. if a single feature scores 'moderate adverse' and this is the highest individual assessment score for all features then the overall assessment score should be 'moderate adverse'.

However, applying water quality, hydromorphology and flood risk mitigation will reduce the assessment score to neutral.

TAG Water Environment Impacts Worksheet - Over (operation)

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Possible Measures	Assessment data availability	Scale	Rarity	Substitutability	Importance	Without mitigation		Resource assessment score without mitigation
										Magnitude	Significance	
Study area: 1 km radial buffer from the Scheme extent												
Potential Impacts:												
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic. Potential for the new bridge structure to cause increased shading resulting in the simplification of the riparian zone. This impact can likely be offset through improvements at other locations. At waterbody scale this impact would not be significant.	Swavesey Drain (Main Reach) WFD reported reach: Yes Swavesey Drain (GB105033042770)	Water supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slightly adverse	Insignificant	**Slight adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slightly adverse	Insignificant	
			Conservation value of river corridor	Presence of designations (e.g. SSSI, NNR, LNR, SINCs)	Mare Fen LNR is hydrologically connected to Swavesey Drain (Main Reach).	Regional	Commonplace	Replaceable	High	Negligible	Insignificant	
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic.	Mare Fen watercourse WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic.	Unnamed tributary of Swavesey Drain WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts anticipated - located on the periphery of the 1km study area, upstream of the Scheme.	Swavesey Drain (Cow Fen reach) WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts anticipated - located on the periphery of the 1km study area.	Swavesey Drain (Mare Fen reach) WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts anticipated - located on the periphery of the 1km study area.	New Dock watercourse WFD reported reach: No Located in Swavesey Drain waterbody (GB105033042770)											
No impacts anticipated - located on the periphery of the 1km study area.	Cow Fen watercourse WFD reported reach: Yes Swavesey Drain (GB105033042770)											
Potential increase in impermeable surface area from widening and resurfacing of the existing bridleway resulting in a potential increase in surface water runoff which could result in an increases in flood risk. This impact can likely be mitigated by incorporating sustainable drainage measures, that attenuate runoff volumes, into the design. Widening of existing Bridleway (between the Guided Busway and approximately 80m north east of Swavesey Drain (Main Reach) potentially encroaches into Flood Zones 2 and 3 resulting in a loss of floodplain storage. Potential for the new bridge structure to lead to reduced floodplain storage capacity and constrictions to flow resulting in increased flood risk. Floodplain storage compensation would be required to mitigate for the loss in floodplain.	Swavesey Drain (including the Main Reach, Mare Fen Reach and Cow Fen Reach) floodplain and associated tributaries of the Swavesey Drain	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	Flood Zones 2 and 3 are associated with the watercourse. A section of the Scheme (between the Guided Busway and approximately 80m north east of Swavesey Drain) is located within Flood Zones 2 and 3.	Local	Commonplace	Limited to substitution	Very High	Large adverse	Very highly Significant	**Very large adverse**
			Surface water flooding	Location of surface water flooding	A section of the Scheme (located around Swavesey Drain (Main Reach)) is located within an area at risk of surface water flooding. Also a section at the northern end of the Scheme is located in an area at risk of surface water flooding.	Local	Commonplace	Limited to substitution	Very High	Large adverse	Very highly Significant	

No impacts anticipated as no additional pollutants are expected from the non-motorised traffic. Also it is assumed the Scheme involves no major below ground structures which could potentially impact groundwater levels and flows.	Secondary A superficial drift aquifer											
No impacts anticipated as no additional pollutants are expected from the non-motorised traffic. Also it is assumed the Scheme involves no major below ground structures which could potentially impact groundwater levels and flows.	Secondary (undifferentiated) superficial drift aquifer											

Reference Sources

Environmental datasets held on Defra's MAGIC website https://magic.defra.gov.uk/home.htm
Environment Agency - Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/
British Geological Survey's Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html
Surface water flooding areas - https://check-long-term-flood-risk.service.gov.uk/map
Route Alignment - \\wsatkins.com\project\GBPEB\Water\WENV\Projects\St Ives Greenway\7 WIP\Water environment\Proposed works\Over Bridleway\WIP\WIP-Worksheet

Summary Assessment Score (Post mitigation)

Very Large Adverse

Qualitative Comments

The Scheme will potentially result in an increase in impermeable surface from widening and resurfacing of the existing bridleway. There is potential for this increase in impermeable area to cause an increase in flood risk. Sustainable drainage measures that attenuate runoff volumes could be implemented to mitigate an increase in surface water flood risk or fluvial flood risk associated with more water entering a watercourse.

The Scheme encroaches into Flood Zones 2 and 3 of Swavesey Drain. Widening and resurfacing of the existing bridleway and replacement of the existing bridge over Swavesey Drain with a new bridge will be undertaken within Flood Zones 2 and 3, potentially resulting in a loss of floodplain. There is the potential that floodplain storage compensation would be required to mitigate for this loss. Potential impacts on flood risk would need to be further assessed through a Flood Risk Assessment (FRA).

There are no surface water quality or groundwater quality impacts anticipated due to no additional pollutants being generated by the Scheme's use. The replacement of the existing bridge with a new bridge could potentially impact the hydromorphology of Swavesey Drain. This impact can likely be offset through improvements at other locations. Potential impacts on hydromorphology would need to be further assessed through a Water Framework Directive (WFD) Compliance Assessment.

It is assumed that there will be no below ground structures which interact with groundwater during the operation of the Scheme, therefore there will be no impact to groundwater flow, levels and quality.

As there are potential impacts which are very highly significant the overall assessment score for the operation of the Scheme is very large adverse. This has been determined with reference to sections 5.3.15 – 5.3.20 and 10.2 of TAG UNIT A3 - Environmental Impact Appraisal, May 2019, Department for Transport, Transport Analysis Guidance, as summarised below:
• Most adverse category. The Scheme as a whole is assessed according to the most adverse assessment of the features affected i.e. if a single feature scores 'large adverse' and this is the highest individual assessment score for all features then the overall assessment score should be 'large adverse'.

However, applying flood risk and hydromorphology mitigation will reduce the assessment score to neutral.

TAG Water Environment Impacts Worksheet - Fen Drayton link (construction)

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Possible Measures	Assessment data availability	Scale	Rarity	Substitutability	Importance	Without mitigation: Magnitude	Without mitigation: Significance	Resource assessment score without mitigation
Study area: 1 km radial buffer from the Scheme extent												
Potential Impacts:												
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	River Great Ouse WFD reported reach: Yes Ouse (Rxton to Earith) water body (GB105033047921)	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Good (2019) Objective: Good (2015)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	
			Conservation value of river corridor	Presence of designations (e.g. SSSI, NNR, LNR, SINCs)	No designated sites are located within the study area.							
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). The drain crosses the Scheme at Hollywell Ferry Road but no alterations to the existing watercourse crossing and no in channel works are anticipated. However, there are potential impacts to hydromorphology resulting from construction works in close proximity to watercourses e.g. through the increase of sediment in surface water runoff, damage to riparian vegetation, river banks or bed which may alter the morphological functioning of the channel. This impact can likely be mitigated by ensuring sediment management measures are implemented where there is potential for surface water runoff to carry sediments from work areas to watercourses in line with Guidance for Pollution Prevention. At waterbody scale these impact would not be significant	Oxholme Drain, Ordinary Watercourse WFD reported reach: No Located in the WFD Ouse (Roxton to Earith) water body (GB105033047921)	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Good (2019) Objective: Good (2015)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	
			Conservation value of river corridor	Presence of designations (e.g. SSSI, NNR, LNR, SINCs)	No designated sites are located within the study area.							
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Fen Drayton Drain WFD reported reach: Yes Fen Drayton Drain water body (GB105033042740)	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Good (2019) Objective: Good (2015)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	
			Conservation value of river corridor	Presence of designations (e.g. SSSI, NNR, LNR, SINCs)	No designated sites are located within the study area.							

Potential increase in flood risk, both to the Scheme and surrounding land uses arising from: the storage of materials or temporary changes in topography and earthworks reducing floodplain capacity or impeding flood flow routes, an increase in temporary impermeable areas at site compounds increasing rainfall runoff and discharge of abstracted water (used in construction processes). This impact can likely be mitigated. Mitigation measures could include: - Developing a drainage strategy to address the management of surface waters to ensure flood risk to the surrounding area is not increased. - Developing Flood Management Plans to ensure the proposed construction site can be safely operated and will not be affected in the event of a flood, where floodplain working to be minimised as far as possible; - Ensuring temporary land-take for construction include adequate areas of land set aside for robust flood control measures, for example sustainable drainage control; - Ensuring temporary flood compensation areas are put in place in advance of any earthworks resulting in loss of floodplain.	The River Great Ouse floodplain and associated tributaries of the River Great Ouse. The Scheme does not cross the watercourse but flood zones 2 and 3 which are associated with the watercourse are within the study area.	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	The entire extent of the Scheme is within Flood Zones 2 and 3.	Local	Commonplace	Limited potential for substitution	Very High	Slight Adverse	Significant	**Moderate adverse**
			Surface water flooding	Location of surface water flooding	Within the study area there are areas at low, medium and high risk of surface water flooding along Holywell Ferry Road near Fen Drayton recreational ground.	Local	Commonplace	Limited potential for substitution	Very High	Slight Adverse	Significant	
Potential for deterioration in groundwater quality resulting from construction activities e.g. spillages of fuels and other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Secondary A Superficial drift Aquifer Not located in a WFD Groundwater Body	Water supply	Groundwater vulnerability	Location and grade of source protection zone	No Source protection zones within the study area.							**Slight adverse**
				Classification of aquifer vulnerability	Groundwater vulnerability classification: Secondary A Aquifer. Assessed as having medium-low vulnerability	Local	Rare	Limited potential for substitution	High	Slight Adverse	Low significance	
				Classification/status and objective under WFD	Not located in WFD Groundwater Body							
		Biodiversity	Conservation value of areas fed by groundwater	Presence of Groundwater Dependant Terrestrial Ecosystems under the WFD	Site is not within Groundwater Dependant Terrestrial Ecosystems							

Reference Sources

Environmental datasets held on Defra's MAGIC website https://magic.defra.gov.uk/home.htm
Environment Agency - Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/
British Geological Survey's Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html
Data.gov - https://www.data.gov.uk/
Surface water flooding areas - https://check-long-term-flood-risk.service.gov.uk/map
Route Alignment -\\wsatkins.com\project\GBPEB\Water\WENV\Projects\St Ives Greenway\7 WIP\Water environment\Proposed works\Fen Drayton\WIP

Summary Assessment Score (Pre mitigation)

Moderate Adverse

Qualitative Comments

The general construction activities associated with the Scheme could potentially result in the deterioration of the water quality of the River Great Ouse, Fen Drayton Drain and the Oxholme Drain through spillages of fuels or other contaminating liquids from construction activities. However, this impact can be mitigated through adopting good working practices. Although now withdrawn by the Environment Agency the Pollution Prevention Guidelines still detail good practice advice for undertaking work which may have the potential to result in water pollution. The CIRIA guidance C648, 'Control of Water Pollution from Linear Construction Sites' also provides good advice. This impact also applies to groundwater.

There is the potential that construction activities could cause an increase in flood risk to the Scheme itself and surrounding land uses through temporary site compounds for example but this can be mitigated through good working practices including minimising floodplain working and locating compounds outside of the Flood Zones 2 and 3 as far as possible. Due to the Scheme being located in Flood Zones 3 a Flood Risk Assessment (FRA) will be required.

It has been assumed that the Scheme will not require any major below ground works (e.g. retaining walls) and therefore no impacts on groundwater levels and flows are anticipated. The Scheme crosses the Oxholme Drain, but it is assumed no modification of the existing watercourse crossing is required and no in channel works are anitcipated. However, there are potential impacts to hydro morphology resulting from construction works in close proximity to watercourses, these impacts can likely be mitigated by ensuring sediment management measures are implemented where there is potential for surface water runoff to carry sediments from work areas to the Oxholme Drain in line with Guidance for Pollution Prevention.

As there are potential impacts which are significant, the overall assessment score for the construction of Scheme is Moderate Adverse. This has been determined with reference to sections 5.3.15 – 5.3.20 and 10.2 of TAG UNIT A3 - Environmental Impact Appraisal, May 2019, Department for Transport, Transport Analysis Guidance, as summarised below:

TAG Water Environment Impacts Worksheet - Fen Drayton link (operation)

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Possible Measures	Assessment data availability	Scale	Rarity	Substitutability	Importance	Without mitigation: Magnitude	Without mitigation: Significance	Resource assessment score without mitigation
Study area: 1 km radial buffer from the Scheme extent												
Potential Impacts:												
No impacts anticipated as no additional pollutants are expected from the non-motorised traffic.	River Great Ouse WFD reported reach: Yes Ouse (Roxton to Earith) water body (GB105033047921)											
No impacts anticipated as no additional pollutants are expected from the non-motorised traffic. Although the Scheme crosses the Oxholme Drain no alterations to the existing watercourse crossing are anticipated.	Oxholme Drain WFD reported reach: No Located in the WFD Ouse (Roxton to Earith) water body (GB105033047921)											
No impacts anticipated as no additional pollutants are expected from the non-motorised traffic.	Fen Drayton drain WFD reported reach: Yes Fen Drayton Drain water body (GB105033042740)											
The proposed Greenway uses existing roads and therefore does not encroach into the floodplain. It is assumed there will be no new impermeable surface therefore no increased risk of flooding. There are potential minor changes to ground levels for the provision of 11 sinusoidal road humps. These would be a maximum of 75mm high. These road humps could potentially impact floodplain volumes and flood risk.	The River Great Ouse floodplain and associated tributaries of the River Great Ouse	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	The entire extent of the Scheme is within Flood Zones 2 and 3.	Local	Commonplace	Limited potential for substitution	Very High	Negligible	Low Significance	**Neutral**
No impacts anticipated as no additional pollutants are expected from the non-motorised traffic. Also it is assumed the Scheme involves no major below ground structures which could potentially impact groundwater levels and flows.	Secondary A Superficial drift Aquifer Not located in the WFD Groundwater Body											

Reference Sources

Environmental datasets held on Defra's MAGIC website https://magic.defra.gov.uk/home.htm
Environment Agency - Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/
British Geological Survey's Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html
Data.gov - https://www.data.gov.uk/
Surface water flooding areas - https://check-long-term-flood-risk.service.gov.uk/map
Route Alignment - \\wsatkins.com\project\GBPEB\Water\WENV\Projects\St Ives Greenway\7 WIP\Water environment\Proposed works\Fen Drayton\WIP

Summary Assessment Score (Post mitigation)

Neutral

Qualitative Comments

The only operational impact identified relates to the potential minor changes to ground levels for the provision of sinusoidal road humps. However, these minor changes in ground level in the context of the wide expansive floodplain in the area would have a negligible impact on flood risk and floodplain volumes. It is assumed there will be no new impermeable area and no encroachment into the floodplain, therefore no increase in flood risk. However, because the Scheme is located within Flood Zones 3 a Flood Risk Assessment (FRA) will be required.

It is assumed there will be no alternations to the existing Oxholme Drain crossing therefore no hydromorphology impacts are anticipated. Also no water quality impacts are anticipated due to there being no additional pollutants generated from the non-motorised traffic which uses the Greenway. It has been assumed that the Scheme will not require any major below ground structures (e.g. retaining walls) and therefore no impacts on groundwater levels and flows are anticipated.

As there is only one potential impact of negligible magnitude, the overall assessment score for the construction of Scheme is Neutral. This has been determined with reference to sections 5.3.15 – 5.3.20 and 10.2 of TAG UNIT A3 - Environmental Impact Appraisal, May 2019, Department for Transport, Transport Analysis Guidance, as summarised below:

- Most adverse category. The Scheme as a whole is assessed according to the most adverse assessment of the features affected i.e. if a single feature scores 'moderate adverse' and this is the highest individual assessment score for all features then the overall assessment score should be 'moderate adverse'.

TAG Water Environment Impacts Worksheet - Oakington-Cottenham (construction)

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Possible Measures	Assessment data availability	Scale	Rarity	Substitutability	Importance	Without mitigation: Magnitude	Without mitigation: Significance	Resource assessment score without mitigation
Study area: 1 km radial buffer from the Scheme extent												
Potential Impacts:												
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). The Scheme crosses the watercourse but no alterations to the existing watercourse crossing and no in channel works are anticipated. However, there are potential impacts to hydromorphology resulting from construction works in close proximity to the watercourse e.g. through the increase of sediment in surface water runoff, damage to riparian vegetation, river banks or bed which may alter the morphological functioning of the channel. This impact can likely be mitigated by ensuring sediment management measures are implemented where there is potential for surface water runoff to carry sediments from work areas to watercourses in line with Guidance for Pollution Prevention. At waterbody scale these impact would not be significant	Beck Brook WFD reported reach: Yes Old West River Water Body (GB205033043375)	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight Adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slight Adverse	Insignificant	
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Various unnamed tributaries of Beck Brook WFD reported reach: No Located in the WFD Old West River Water Body (GB205033043375)	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight Adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slight Adverse	Insignificant	
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Unnamed tributary of Beck Brook (Main River) WFD reported reach: No Located in the WFD Old West River Water Body (GB205033043375)	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight Adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slight Adverse	Insignificant	
Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Public Drain WFD reported reach: No Located in the WFD Old West River Water Body (GB205033043375).	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight Adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slight Adverse	Insignificant	

Potential for deterioration in water quality resulting from construction activities e.g. spillages of fuels ad other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a Construction Environmental Management Plan (CEMP) which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). The Scheme potentially crosses a minor watercourse located on the southern side of Oakington Road, approximately 300m north east of Setbroad Farm. It is assumed no new watercourse crossing or no alterations to an existing watercourse crossing are required. It is also assumed there will be no in channel works. However, there are potential impacts to hydromorphology resulting from construction works in close proximity to the watercourse e.g. through the increase of sediment in surface water runoff, damage to riparian vegetation, river banks or bed which may alter the morphological functioning of the channel. This impact can likely be mitigated by ensuring sediment management measures are implemented where there is potential for surface water runoff to carry sediments from work areas to watercourses in line with Guidance for Pollution Prevention. At waterbody scale these impact would not be significant.	Various unnamed tributaries of River Great Ouse WFD reported reach: No Located in the WFD Old West River Water Body (GB205033043375).	Water Supply	Chemical water quality	Existing chemical classification/status and objective under the WFD.	Existing chemical classification: Fail (2019) Chemical objective: Good (2063)	Regional	Commonplace	Replaceable	Medium	Slight Adverse	Insignificant	**Slight Adverse**
		Biodiversity	Biological water quality	Existing ecological classification/status and objective under the WFD	Existing classification: Moderate (2019) Objective: Moderate (2015)	Regional	Commonplace	Replaceable	Low	Slight Adverse	Insignificant	
Potential increase in flood risk, both to the Scheme and surrounding land uses arising from: the storage of materials or temporary changes in topography and earthworks reducing floodplain capacity or impeding flood flow routes, an increase in temporary impermeable areas at site compounds increasing rainfall runoff and discharge of abstracted water (used in construction processes). This impact can likely be mitigated. Mitigation measures could include: - Developing a drainage strategy to address the management of surface waters to ensure flood risk to the surrounding area is not increased. - Developing Flood Management Plans to ensure the proposed construction site can be safely operated and will not be affected in the event of a flood, where floodplain working to be minimised as far as possible; - Ensuring temporary land-take for construction include adequate areas of land set aside for robust flood control measures, for example sustainable drainage control; - Ensuring temporary flood compensation areas are put in place in advance of any earthworks resulting in loss of floodplain.	Beck Brook floodplain and the associated tributaries of Beck Brook	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	Flood Zones 2 and 3 are associated with the watercourse. The South western stretch of the Scheme encroaches into Flood Zones 2 and 3.	Local	Commonplace	Limited potential for substitution	Very High	Slight Adverse	Significant	**Moderate adverse**
			Surface water flooding	Location of surface water flooding	Areas at high, medium and low risk of flooding within 1km of the Scheme. The Scheme encroaches into areas of High, Medium and Low risk of surface water flooding in patches throughout the extent of the Scheme	Local	Commonplace	Limited potential for substitution	Very High	Slight Adverse	Significant	
Potential increase in flood risk, both to the Scheme and surrounding land uses arising from: the storage of materials or temporary changes in topography and earthworks reducing floodplain capacity or impeding flood flow routes, an increase in temporary impermeable areas at site compounds increasing rainfall runoff and discharge of abstracted water (used in construction processes). This impact can likely be mitigated. Mitigation measures could include: - Developing a drainage strategy to address the management of surface waters to ensure flood risk to the surrounding area is not increased. - Developing Flood Management Plans to ensure the proposed construction site can be safely operated and will not be affected in the event of a flood, where floodplain working to be minimised as far as possible; - Ensuring temporary land-take for construction include adequate areas of land set aside for robust flood control measures, for example sustainable drainage control; - Ensuring temporary flood compensation areas are put in place in advance of any earthworks resulting in loss of floodplain.	The River Great Ouse floodplain and associated tributaries of the River Great Ouse	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	Flood Zones 2 and 3 are associated with the watercourse. The South eastern stretch of the study area encroaches into Flood Zones 2 and 3.	Local	Commonplace	Limited potential for substitution	High	Slight Adverse	Low significance	**Slight Adverse**
			Surface water flooding	Location of surface water flooding	Areas at high, medium and low risk of surface water flooding within 1km of the Scheme. The study area encroaches into areas of High, Medium and Low risk of surface water flooding	Local	Commonplace	Limited potential for substitution	High	Slight Adverse	Low significance	

Potential for deterioration in groundwater quality resulting from construction activities e.g. spillages of fuels and other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Principal Bedrock Aquifer Groundwater body: Cam and Ely Ouse Woburn Sands (GB40501G445700)	Water supply	Groundwater vulnerability	Classification of aquifer vulnerability	Majority of the Scheme is underlain by Principal Bedrock Aquifer. Majority of the Scheme extent is assessed as having high vulnerability, a small stretch of the Scheme at Westwick is assessed as having medium-high and medium vulnerability.	Local	Rare	Limited to substitution	Very High	Slight Adverse	Significant	**Slight Adverse**
				Classification/status and objective under WFD	Existing classification (overall waterbody): Good (2019) Objective (overall waterbody): Good (2021)	Local	Rare	Limited to substitution	Medium	Slight Adverse	Insignificant	
Potential for deterioration in groundwater quality resulting from construction activities e.g. spillages of fuels and other contaminating liquids, accidental leaks of hazardous materials, mobilisation of contamination following disturbance of contaminated ground or groundwater. This impact can likely be mitigated by adopting a CEMP which will include mitigation measures associated with good site practice and the preparation of robust method statements (e.g. Pollution Prevention). At waterbody scale this impact would not be significant.	Secondary A Superficial Aquifer Groundwater body: Cam and Ely Ouse Woburn Sands (GB40501G445700)	Water supply	Groundwater vulnerability	Classification of aquifer vulnerability	The southern end of the Scheme (around Westwick) is underlain by a Secondary A Superficial Aquifer. This area is assessed as having medium to high vulnerability.	Local	Rare	Limited to substitution	High	Slight Adverse	Low Significant	**Slight Adverse**
				Classification/status and objective under WFD	Existing classification (overall waterbody): Good (2019) Objective (overall waterbody): Good (2021)	Local	Rare	Limited to substitution	Medium	Slight Adverse	Insignificant	

Reference Sources

Environmental datasets held on Defra's MAGIC website https://magic.defra.gov.uk/home.htm
Environment Agency - Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/
British Geological Survey's Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html
Data.gov - https://www.data.gov.uk/
Surface water flooding areas - https://check-long-term-flood-risk.service.gov.uk/map
Route Alignment - \\wsatkins.com\project\GBPEB\Water\WENV\Projects\St Ives Greenway\7 WIP\Water environment\Proposed works\Oakington – Cottenham\WIP

Summary Assessment Score (Pre mitigation)

Moderate Adverse

Qualitative Comments

The general construction activities associated with the Scheme could potentially result in the deterioration of the water quality of Beck Brook and its tributaries, the Public Drain and also tributaries of the River Great Ouse through spillages of fuels or other contaminating liquids from construction activities. However, this impact can be mitigated through adopting good working practices. Although now withdrawn by the Environment Agency the Pollution Prevention Guidelines still detail good practice advice for undertaking work which may have the potential to result in water pollution. The CIRIA guidance C648, 'Control of Water Pollution from Linear Construction Sites' also provides good advice. This impact also applies to groundwater.

The Scheme crosses Beck Brook and potentially crosses a minor watercourse located on the southern side of Oakington Road (assumed to be a tributary of the River Great Ouse), approximately 300m north east of Setbroad Farm. It is assumed that there will be no alterations to any existing watercourse crossings and no new crossings required, however for watercourses that are crossed by the Scheme, any in channel or near channel works may impact hydromorphology as there is potential for loss of vegetation, mobilisation of sediment and damage to banks if works are carried out in close proximity to the watercourse. This impact can likely be mitigated by adopting best practice mitigation to ensure that any works in close proximity to a watercourses will not result in deterioration to channel planform and vegetation. Also by implementing sediment management plans can mitigate mobilisation of any sediments.

There is the potential that construction activities could cause an increase in flood risk to the Scheme itself and surrounding land uses through temporary site compounds for example but this can be mitigated through good working practices including minimising floodplain working and locating compounds outside of the Flood Zones 2 and 3 as far as possible.

It has been assumed that the Scheme will not require any major below ground works (e.g. retaining walls) and therefore no impacts on groundwater levels and flows are anticipated.

As there are potential impacts which are significant, the overall assessment score for the construction of Scheme is Moderate Adverse. This has been determined with reference to sections 5.3.15 – 5.3.20 and 10.2 of TAG UNIT A3 - Environmental Impact Appraisal, May 2019, Department for Transport, Transport Analysis Guidance, as summarised below:
• Most adverse category. The Scheme as a whole is assessed according to the most adverse assessment of the features affected i.e. if a single feature scores 'moderate adverse' and this is the highest individual assessment score for all features then the overall assessment score should be 'moderate adverse'.

However, applying water quality, hydromorphology and flood risk mitigation will reduce the potential impacts to low or insignificant with an overall assessment score of Neutral.

TAG Water Environment Impacts Worksheet - Oakington-Cottenham (operation)

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Possible Measures	Assessment data availability	Scale	Rarity	Substitutability	Importance	Without mitigation		Resource assessment score without mitigation
										Magnitude	Significance	
Study area: 1 km radial buffer from the Scheme extent												
Potential Impacts:												
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic. It is assumed that there will be no new watercourse crossings or changes to existing crossings therefore no hydromorphology impacts are anticipated.	Beck Brook WFD reported reach: Yes Old West River Water Body (GB205033043375)											
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic. It is assumed that there will be no new watercourse crossings or changes to existing crossings therefore no hydromorphology impacts are anticipated.	Various unnamed tributaries of Beck Brook WFD reported reach: No Located in the WFD Old West River Water Body (GB205033043375)											
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic. It is assumed that there will be no new watercourse crossings or changes to existing crossings therefore no hydromorphology impacts are anticipated.	Unnamed tributary of Beck Brook (Main River) WFD reported reach: No Located in the WFD Old West River Water Body (GB205033043375)											
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic. It is assumed that there will be no new watercourse crossings or changes to existing crossings therefore no hydromorphology impacts are anticipated.	Public Drain WFD reported reach: No Located in the WFD Old West River Water Body (GB205033043375)											
No impacts to water quality are anticipated as no additional pollutants are expected from the non-motorised traffic. It is assumed that there will be no new watercourse crossings or changes to existing crossings therefore no hydromorphology impacts are anticipated.	Various unnamed tributaries of River Great Ouse WFD reported reach: No Located in the WFD Old West River Water											
Potential increase in impermeable surface area from: - Widening of an existing cycle lane and carriageway widening on Mill Lane; - Widening of shared use path on Station Road; and - Creation of a new bridleway on southern side of Oakington Road. This could potentially cause an increase in surface water runoff which could result in an increase in flood risk. This impact can likely be mitigated by incorporating sustainable drainage measures, that attenuate runoff volumes, into the design Potential encroachment into Flood Zones 2 & 3 resulting in an increase in flood risk. To mitigate this impact floodplain storage compensation will likely be required. It is assumed that there will be no modifications to existing culverts/bridges.	Beck Brook floodplain and the associated tributaries of Beck Brook	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	Flood Zones 2 and 3 are associated with the watercourse. The South western stretch of the Scheme encroaches into Flood Zones 2 and 3.	Local	Commonplace	Limited potential for substitution	Very High	Large Adverse	Very highly Significant	**Very large Adverse**
			Surface water flooding	Location of surface water flooding	Areas at high, medium and low risk of flooding within 1km of the Scheme. The Scheme encroaches into areas of High, Medium and Low risk of surface water flooding in patches throughout the extent of the Scheme	Local	Commonplace	Limited potential for substitution	Very High	Large Adverse	Very highly Significant	

Potential increase in impermeable surface area from: - Widening of an existing cycle lane and carriageway widening on Mill Lane; - Widening of shared use path on Station Road; and - Creation of a new bridleway on southern side of Oakington Road. This could potentially cause an increase in surface water runoff which could result in an increase in flood risk. This impact can likely be mitigated by incorporating sustainable drainage measures, that attenuate runoff volumes, into the design. It is assumed that there will be no modifications to existing culverts/bridges.	The River Great Ouse floodplain and associated tributaries of the River Great Ouse	Conveyance of flood flows	Presence of flood zones	Existing flood risk/flood return period	Flood Zones 2 and 3 are associated with the watercourse. The South eastern stretch of the study area encroaches into Flood Zones 2 and 3.	Regional	Commonplace	Limited potential for substitution	High	Slight Adverse	Low Significant	**Slight Adverse**
			Surface water flooding	Location of surface water flooding	Areas at high, medium and low risk of surface water flooding within 1km of the Scheme. The study area encroaches into areas of High, Medium and Low risk of surface water flooding	Regional	Commonplace	Limited potential for substitution	High	Slight Adverse	Low Significant	
No water quality impacts anticipated as no additional pollutants are expected from the non-motorised traffic. Also it is assumed the Scheme involves no major below ground structures which could potentially impact groundwater levels and flows.	Principal Bedrock Aquifer Groundwater body: Cam and Ely Ouse Woburn Sands (GB40501G445700)											
No water quality impacts anticipated as no additional pollutants are expected from the non-motorised traffic. Also it is assumed the Scheme involves no major below ground structures which could potentially impact groundwater levels and flows.	Secondary A Superficial Aquifer Groundwater body: Cam and Ely Ouse Woburn Sands (GB40501G445700)											

Reference Sources

Environmental datasets held on Defra's MAGIC website https://magic.defra.gov.uk/home.htm
Environment Agency - Catchment Data Explorer http://environment.data.gov.uk/catchment-planning/
British Geological Survey's Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html
Data.gov - https://www.data.gov.uk/
Surface water flooding areas - https://check-long-term-flood-risk.service.gov.uk/map
Route Alignment - \\wsatkins.com\project\GBPEB\Water\WENV\Projects\St Ives Greenway\7 WIP\Water environment\Proposed works\Oakington – Cottenham\WIP

Summary Assessment Score (Pre mitigation)

Very large adverse

Qualitative Comments

The Scheme will potentially result in an increase in impermeable surface from the widening of an existing cycle lane and carriageway on Mill Lane, widening of a shared use path on Station Road and creation of a new bridleway on Oakington Road. There is potential for this increase in impermeable area to cause an increase in flood risk. Sustainable drainage measures that attenuate runoff volumes could be implemented to mitigate an increase in surface water flood risk or fluvial flood risk associated with more water entering a watercourse.

There is the possibility that the Scheme could encroach into Flood Zones 2 and 3 of the Beck Brook and its associated tributaries. If this were the case then floodplain storage compensation would be required. Potential impacts on flood risk would need to be further assessed through a Flood Risk Assessment (FRA).

There are no surface water quality or groundwater quality impacts anticipated due to no additional pollutants being generated by the Scheme's use. It is also anticipated that there will be no impacts on watercourse hydro morphology. The Scheme crosses the Beck Brook and potential crosses a minor watercourse which flows parallel to Oakington Road but it is anticipated that no modifications will be required to the existing watercourse crossings or no new watercourse crossings will be required.

It is assumed that there will be no below ground structures which interact with groundwater during the operation of the Scheme, therefore there will be no impact to groundwater flow, levels and quality.

As there are potential impacts which are very highly significant the overall assessment score for the operation of the Scheme is very large adverse. This has been determined with reference to sections 5.3.15 – 5.3.20 and 10.2 of TAG UNIT A3 - Environmental Impact Appraisal, May 2019, Department for Transport, Transport Analysis Guidance, as summarised below:

- Most adverse category. The Scheme as a whole is assessed according to the most adverse assessment of the features affected i.e. if a single feature scores 'moderate adverse' and this is the highest individual assessment score for all features then the overall assessment score should be 'moderate adverse'.

However, applying flood risk mitigation will reduce the assessment score to neutral.

Appendix C. PA and AMCB tables

The Transport Economic Efficiency (TEE) table has not been included as the user benefits were estimated using the DfT's AMAT tool which does not split the benefits by commuter, business and other users. Journey time savings for existing users also does not split the benefits by commuter, business and other users (although it is weighted).

Public Accounts (PA) Table - St Ives Greenway

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Funding						
Revenue	0					
Operating Costs	-615		-615			
Investment Costs	0					
Developer and Other Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	-615	*(7)*				
Central Government Funding: Transport						
Revenue	0					
Operating costs	0					
Investment Costs	3,763,526		3,763,526			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0					
NET IMPACT	3,763,526	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	-8,248	*(9)*				
TOTALS						
Broad Transport Budget	3,762,910	*(10) = (7) + (8)*				
Wider Public Finances	-8,248	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Analysis of Monetised Costs and Benefits (AMCB) Table - St Ives Greenway

Noise	216	*(12)*
Local Air Quality	625	*(13)*
Greenhouse Gases	7,063	*(14)*
Journey Quality	316,274	*(15)*
Physical Activity	1,352,092	*(16)*
Accidents	4,203	*(17)*
Economic Efficiency: Consumer Users (All Users)	27,172	*(1a + 1b + 5)*
Private sector contributions (as a negative benefit)		
Wider Public Finances (Indirect Taxation Revenues)	8,248	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	1,699,396	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	3,762,910	*(10)*
Present Value of Costs (see notes) (PVC)	3,762,910	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	-2,063,515	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	0.5	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Appendix D. Appraisal Summary Table (AST)

Appraisal Summary Table

Date produced:	16	5	2023

Contact:	
Name	Thomas Fitzpatrick
Organisation	GCP
Role	Promoter/Official

Name of scheme:	St Ives Greenway
Description of scheme:	The St Ives Greenway is one the twelve Greater Cambridge Greenways that aim to make journeys easier, cheaper, healthier, greener and pleasant into and out of Cambridge as well as to enjoy the countryside for leisure purposes. The St Ives Greenway provides improvements to walking and cycling along the existing Cambridgshire Guided Busway, with improved connectivity between local villages and the busway.

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The scheme will result in decongestion benefits to road users as a result of modal shift to active modes. This impact has been estimated using the DfT's AMAT, and covers business, commuting and other users.	Value of journey time changes(£): Net journey time changes (£): 0 to 2min / 2 to 5min / > 5min	Slight Beneficial	27,172	Slight Beneficial (across all users)
	Reliability impact on Business users	Not assessed	-	Not assessed		
	Regeneration	Not assessed	-	Not assessed		
	Wider Impacts	Not assessed	-	Not assessed		
Environmental	Noise	The scheme 1km impact area has a higher proportion of elderly people than the national average for England, who are particualrly vulnerable to noise. The scheme is expected to produce mode shift from motorised to active modes, and hence a reduction in motorised vehicle-kilometres. This in turn results in reduced noise.	-	Slight Beneficial	216	Slight Beneficial
	Air Quality	The scheme 1km impact area has a higher proportion of children than the national average, who are particualrly vulnerable to air quality issues. Modal shift to cycling and walking and the associated reduction in road traffic due to the improvements and introduction of facilities is expected to result in improved air quality.	-	Slight Beneficial	625	Slight Beneficial
	Greenhouse gases	The scheme is expected to produce mode shift from motorised to active modes, and hence a reduction in motorised vehicle-kilometres. This in turn results in reduced greenhouse gas impacts (carbon emissions).	Change in non-traded carbon over 60y (CO2e) Change in traded carbon over 60y (CO2e)	-	7,063	
	Landscape/ Townscape	The three schemes are located in typical Cambridgeshire landscape and could be accomodated with minimal impact.	-	Neutral / Slight Adverse	-	
	Historic Environment	As the Scheme will predominantly be an extension and modification to the exisiting bridleway and road, no sustantial adverse settings impacts to designated heritage assets are anticipated. The installation of the greenway could mean potential for as yet unknown archaeology particularly in the location of the Over link bridleway which should be mitigated for during construction.	-	Neutral	-	
	Biodiversity	There are various nature reserves, wildlife sites, habitats and animals in the area that are not directly affected by the scheme proposal but do have the potential of impacts such as pollution during the construction phase.	-	Slight Adverse	-	
	Water Environment	**Fen Drayton link** The scheme is located in Flood Zone 3, where construction could cause an increase to flood risk and deterioration of the water quality of the River Great Ouse, Fen Drayton Drain, Oxholme Drain and groundwater. As the Scheme crosses the Oxholme Drain there are potential impacts to the Drains hydromorphology from construction works being in close proximity to watercourses.	-	Moderate Adverse*	-	
		Over spur The scheme is located within Flood Zones 2 and 3 where potentially increasing the impermeable area could increase the flood risk. The replacement of the existing bridge could impact the hydromorphology of Swavesey Drain. The general construction activities could result in the deterioration of the water quality of the Swavesey Drain, Mare Fen watercourse, an unnamed tributary of Swavesey Drain and groundwater.	-	Very Large Adverse*	-	
		Oakington-Cottenham The scheme is located near Flood Zones 2 and 3 increasing flood risk. The scheme crosses Beck Brook and potentially crosses a minor watercourse located on the southern side of Oakington Road where there are potential impacts to the watercourses hydromorphology. Construction activities could potentially increase flood risk, and deterioration of the water quality of Beck Brook and its tributaries, the Public Drain, tributaries of the River Great Ouse and groundwater.	-	Very Large Adverse*	-	

Social	Commuting and Other users	The scheme would reduce journey times by approximatley 1.5minutes for a number of existing and new cyclists on the Over spur by providing new safer, more direct segregated cycling infrastructure for residents travelling towards the busway/Cambridge. The scheme is expected to facilitate some mode shift from car to cycling and therefore will benefit the local highway network in terms of reduced congestion.	Value of journey time changes(£) Net journey time changes (£) 0 to 2min / 2 to 5min / > 5min	Not assessed	63,297	See under 'business users'
	Reliability impact on Commuting and Other users	The greenway will not provide any additional reliability on the route, and has not been monetised.	-	Not assessed	-	
	Physical activity	The improvement to active mode facilities will encourage more walking and cycling, and a mode shift from car to active travel. This will result in a small increase in physical activity and promote active commuting.	-	Moderate Beneficial	1,352,092	
	Journey quality	The improvements to the cycling and walking infrastructure will reduce traveller stress, and improve pleasantness of the journey and user experience particularly through the proposed segregated shared use paths. These proposed paths and traffic calming measures on existing routes will create a safer environment contributing to an improved user experience.	-	Moderate Beneficial	252,977	
	Accidents	The scheme is expected to create a better connected enviornment for non-motorised users, resulting in a mode shift. Users switching from motorised vehicles to active modes will result in a reduction in motor vehicle kilometers and highway accidents. As set out in the economic case, there were no accidents in close proximity to the Greenway which could be prevented by the upgrades.	-	Slight Beneficial	4,203	Slight Beneficial
	Security	Improved lighting provision will increase the feeling of safety for pedestrians and cyclists. Changes to CCTV have not been confirmed, but proposals should incorporate good-quality street lighting and CCTV to improve safey and security of users.	-	Neutral	-	No assessment required
	Access to services	The St Ives Greenway will improve active travel connectivity to the rural settlements along the corridor and accessibility to local services and amenities. New crossing facilities, enhancements and segregated shared use paths will creater a safer connected environment to the busway. The scheme 1km impact area has a higher proportion of children and elderly residents who are particularly vulnerable to accessibility issues. Additionally, there are low proportions of no car households in the impact area of the scheme that should also benefit.	-	Slight Beneficial	-	Slight Beneficial
	Affordability	Those switching to walking or cycling from bus or car will have a lower cost of transport as they will no longer pay fares or fuel and no-fuel vehicle operating costs.	-	Slight Beneficial	-	Slight Beneficial
	Severance	Introduction and enhacements to the spurs in the St Ives Greenway will create better connecivity to the busway, with improved infrastructure providing enhance crossings, share use paths. There are high concentrations of vulnerable groups in the area, where it is expected that they will benefit from the interventions proposed such as new crossings, segregated shared use rpites and traffic calming, hence experience a reduction in actual and percieved severence.	-	Slight Beneficial	-	Moderate Beneficial
	Option and non-use values	The proposed scheme does not introduce new travel options and is therefore not assessed.	-	Not assessed	-	
Public Accounts	Cost to Broad Transport Budget	The scheme requires funding from the Greater Cambridge Partnership City Deal Allocation.	-	-	3,762,910	
	Indirect Tax Revenues	The scheme will have a negative impact on indirect tax revenues through mode shift from cars to active modes.	-	-	8,248	

**Applying water quality, hydromorphology and flood risk mitigation will reduce the assessment score to neutral.*

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