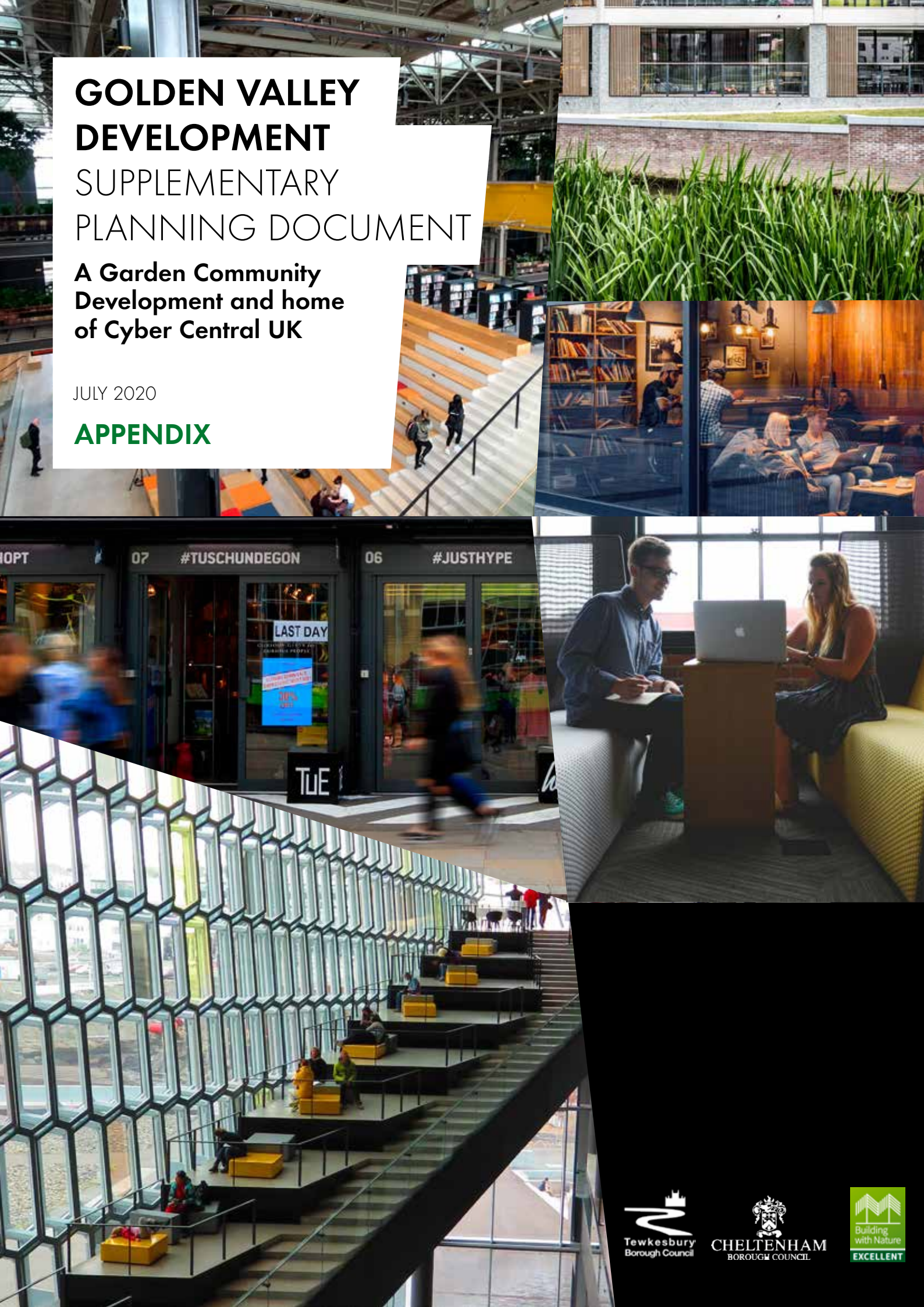


GOLDEN VALLEY DEVELOPMENT SUPPLEMENTARY PLANNING DOCUMENT

**A Garden Community
Development and home
of Cyber Central UK**

JULY 2020

APPENDIX



AVISON
YOUNG

WITH

Allies and Morrison

Hydrock 

Appendices

A1	Engagement	4
	Purpose	
	Engagement activities	
	Summary of key messages	
	Formal consultation	
A2	Site context	14
	Funding related growth context	
	Land ownership	
	Site promotion	
	Policy context	
	Cheltenham's next phase of growth	
	Transport context	
	Opportunities and constraints	
A3	Hayden Works site	
	Longer term phases of growth	32
	Introduction	
	Key principles	
A4	Site capacity study	36
A5	Technical Due Diligence reports	38
A6	Building with Nature report	160



A1 Engagement

A1.1 Purpose

Engagement embedded in the process

- A1.1.1 Engaging with the local community and wider stakeholders is an integral part of the masterplanning process. As part of the preparation of the SPD for West Cheltenham, there have been four community drop-in events and an evening workshop session with community representatives, technical stakeholders, officers and members together with an informal session with an elderly persons complex adjacent to the strategic allocation. This informal consultation has helped to identify the key concerns and priorities and shaped the emerging vision and principles for the draft masterplan SPD, as now presented.
- A1.1.2 The consultation undertaken so far forms part of a wider engagement programme. A formal consultation on the draft SPD will commence in the new year after the document has been approved by both councils.

"People living and working on site is a key aspiration"

"Integration with existing communities to make sure facilities are open and accessible"

Community drop-in events

Wednesday 11th September, 12:30-3pm at Hester's Way Community Centre, GL51 7SU

Wednesday 11th September, 3:30-5:30pm at Springbank Community Centre, GL51 0LG

Thursday 19th September, 1-3:30pm at Tewkesbury-Cheltenham West Community Fire Station, GL51 9SN

Thursday 19th September, 4:30-7:30pm at Gloucestershire College, GL51 7SJ

Figure 1 List of events

A1.2 Engagement activities

Stakeholder workshop

- A1.2.1 A stakeholder workshop was held on Wednesday 3rd September 2019 close to the site at Jurys Inn, Gloucester Road. The purpose of the workshop discussion was to distil the key issues and opportunities relating to activities and facilities; natural landscape and public open space; movement and transport; and sustainability and climate change. These issues were discussed via round table engagement. At the end of the session there was an opportunity to feedback to the wider group about the key priorities discussed.
- A1.2.2 32 stakeholders attended the event representing: *BAE Systems, Bamboo Technology Group, Boddington Parish Council, Cheltenham Borough Homes, Cheltenham Borough Council, Cheltenham churches, Cheltenham County Council, Church of England, GFirst LEP, Gloucestershire County Council, Gloucestershire Local Nature Partnership, Hester's Way Neighbourhood Plan Forum, Hester's Way Partnership, local residents, police, Stagecoach West, Swindon Parish Council, Tewkesbury Borough Council, Uckington Parish Council, University of Gloucestershire and, Wildfowl and Wetlands Trust.*

Community drop-in events

- A1.2.3 In addition to the stakeholder workshop, four drop-in events were held at locations close to the site. The dates and times are shown opposite.
- A1.2.4 The events provided the opportunity for local residents to give their thoughts and ideas about the area, and the key opportunities as the masterplan was developed. A large map of the area was tabled alongside information boards introducing the project and key diagrams showing our initial ideas. 210 people attended across the four events. A summary of the feedback is set out on the following pages.
- A1.2.5 In addition, a supplementary session was held at an elderly persons complex adjacent to the strategic site to aid engagement with residents unable to attend one of the drop in events.



Figure 2 Photos of the consultation events

A1.3 Summary of key messages

Stakeholder workshop summary

1.3.1 Activities and facilities

- GCHQ is an important opportunity for Cheltenham. **Cyber Central needs to be a vibrant environment with a unique offer and a variety of uses to attract employers.** Some felt employment uses might be appropriate in the northern area too.
- There was strong support for employment areas to be mixed-use with **activity in the evenings** for workers, residents and visitors too.
- Ensure the **right amount of social infrastructure** and make it easily accessible to all residents e.g. schools, health services and community spaces. The area currently lacks community gathering spaces and so there is an **opportunity for new facilities that bring people together** across demographics.
- The development must be **integrated well with the existing communities.** This includes physical links e.g. locating facilities by existing communities, as well as the social benefits to the local community e.g. training and development opportunities for local people during the construction period. Occupiers should work with universities to promote education, research and innovation, including opportunities for apprenticeships.

1.3.2 Movement and transport

- There is support for an **integrated walking and cycling network** e.g. to Princess Elizabeth Way, Coronation Square and the station. The station is too far to walk and the cycle route is too convoluted.
- **Improve bus services** which are currently unreliable. Bus routes need to link in with existing communities to improve the services in the area.



- A **parking strategy** will ensure adequate parking for employment as well as some provision for residents (there is a need for access to a car at times). Local employee parking is a major local problem currently.
- **Respect the character of Fiddler's Green Lane.** There is too much traffic here already and the masterplan should address this.
- **Good access to the M5 is needed.** Other ideas for access points were a possible entry via Pheasants Lane; an alternative route along Cheltenham Road East; another connection in from the southern area; and a new road from Gloucester Road.
- The **proposed main route is more than just for access** - it needs to be balanced with the environment being created.
- **Good management of construction traffic** during the building phase is a priority.
- Transport needs to be **embedded in a long-term sustainable transport strategy** which has a link to the Gloucestershire sustainable transport strategy.

1.3.3 Natural landscape and public open space

- **Public open space is important** for employees of Cyber Central (high pressured work) as well as residents and visitors. These should include cafes and other uses so they are actively used.
- Ideas for **types of public open space** include parks and festival space, playgrounds, football pitches and sports centre, formal sports pitches, allotments (could be an extension of existing ones) and an urban forest. Many existing green spaces are tied to schools and not currently accessible.



"We don't want a hard line between old and new - we want one community"

- There is support for **green links to adjoining communities**. Retaining green spaces close to existing neighbourhoods is a priority.
- The **maintenance and good management of public open spaces** is essential.
- **Existing trees and hedges should be preserved**.
- There is support for SUDS, permeable parking with planting and other sustainability initiatives.

1.3.4 Sustainability and climate change

- **Sustainability should be all-encompassing** and goes across all issues. Working towards a **carbon neutral development** is desired. It was recognised that paying for this would be challenging but the masterplan needs to be **ambitious**, incorporating sustainable technologies. Ideas to achieve this include edible orchards, community allotments, home composting, green energy e.g. heat sinks and big enough gardens with growing areas.
- Achieving sustainability is directly linked with **reducing car use** and promoting an attractive, reliable and safe pedestrian and cycling network.
- Empowering the **community to take ownership and steward resources well** is important.

Community drop-in events summary

1.3.5 Activities and facilities

- Attendees at the drop-in see the provision of the **necessary social infrastructure** and services as a priority. There was positive feedback regarding the potential for a new school. There is currently a lack of community meeting spaces and there is support for new community facilities.
- The benefits of keeping the cyber industry in West Cheltenham were highlighted. Ensuring these are realised with regards to **training and jobs** for local people is a priority. Setting targets so these are delivered to existing residents is essential. Other opportunities included flagship connectivity projects which are accessible to nearby neighbourhoods.

- What is the future of Coronation Square and how will the masterplan proposals impact on its future? Questions were also raised about the impact of the development on existing businesses, including local farms. This will need to be addressed in future masterplanning work.

1.3.6 Movement and transport

- There is support for sustainable travel options, including buses, shuttle buses to serve GCHO, car sharing and cycling. An integrated, safe pedestrian and cycle network with ample cycle parking and well connected into the existing street network is key to this development coming forward. People do not currently feel safe cycling around Cheltenham and cycle routes often stop or disappear. Pedestrian crossings need to be in sensible places and pavements widened to support disabled access and to improve safety for all.
- There was positive feedback regarding the potential cycle and pedestrian routes through the existing community at West Cheltenham. It was suggested that a single continuous cycle route from Gloucester and Cheltenham would be beneficial.
- Many attendees at the drop-ins were concerned that the existing wider vehicle network around the site is already pressurised and that an increase in people will lead to greater congestion, parking problems and safety issues on routes around the site, especially:



"Please look after the lovely old trees and plant new ones. Hedgerows too."



- **Safety of Fiddler's Green Lane.** Crossing this road is unsafe, worsened by parking and congestion. Upgraded crossing facilities could assist with this. Any new junction at Telstar Way could prevent a left turn along Fiddlers Green Lane which was welcomed.
- **On-street car parking** caused by local employee parking and school pickups. This is outside the scope of the SPD but is a clear concern and residents want to understand how this will be managed for new employment and educational facilities. There is support for adequate provision of parking on site.
- The **potential increase in traffic on Hayden Lane** and flooding which already occurs here. A suggestion is that any new homes within the safeguarded area should be accessed from Telstar Way.
- The impact of the development on **traffic and safety along Tewkesbury Road and Old Gloucester Road** was highlighted as a possible issue.
- The junction at **Withy Bridge Lane, Old Gloucester Road and Hayden Lane** is currently unsafe.
- A route through the development could help to ease traffic along Princess Elizabeth Way.
- The M5 Junction 10 proposals seem uncertain. An update on this is required.
- Good air quality is considered a priority.
- There was concern about the construction phase and how HGV traffic and builders car parking would be managed. Farmers are especially concerned about the impact the construction phase (and more widely the development plans) will have on their livestock.

1.3.7 **Natural landscape and public open space**

- Cyber Central should 'still feel green' with open space connected to existing green spaces on the edge of the site. There is support for the retention of areas such as the copse to the north west, as well as hedgerows and trees. Specifically, residents are keen for a landscape buffer zone along Henley Road and Old Gloucester Road. There is concern that the new homes will 'loom over' the existing residential areas.
- There is an opportunity to uncover the waterways e.g. Lyn Brook, to increase the amount of green space and the quality of the environment. New water features should be carefully located.
- Retaining views to the countryside, particularly to the west, was highlighted as a priority.
- Information relating to applications for the extension of the existing network of Public Right of Way routes has been shared. Three slightly different alignments of a route from Springbank to the west to meet the existing network of Public Rights of Way have been put forward. The local community are keen that these routes are taken into consideration in making decisions about development proposals for the site.

1.3.8 **Sustainability and climate change**

- Any plans for the development must meet all sustainability standards. People would like green roofs and solar panels, as well as innovative solutions to address the climate change emergency.



What next?

A1.3.9 Whilst many wider stakeholders and local groups recognise the benefits of Cyber Central and the opportunities it brings for existing and new residents, residents at engagement sessions nearest to the site raised localised issues relating to boundaries, loss of green space and views, and regarding trees and hedgerows. General comments were also made relating to the other planned development in and around Cheltenham. The proposals for these sites should be considered as a whole to ensure an integrated approach to development.

A1.3.10 The feedback from the engagement so far has been invaluable in shaping the design process. From the feedback received during this stage of public engagement, we have amended the masterplan in the following ways:

- Emphasis on green spaces close to the existing community - the plan has been altered following drop-in events with local residents who were supportive of a new park close to the Springbank neighbourhood.
- Impact of traffic and car parking - aiming for the new development to have enough car parking to serve the employment and residential areas. Sustainable transport modes including improved bus networks and cycle networks will also contribute to improving access and reducing the reliance on the private car.

- Spreading the impact of employment - although the focus for the employment area will be to the south of the SPD area, close to GCHQ, conversations have highlighted the opportunity to focus some employment space with good access to the new road to J10 of the M5.
- Integration - comments have strengthened the focus on delivering links and shared facilities for new and existing residents.

A1.3.11 On-going conversations with local residents and stakeholders will continue to shape the emerging masterplan SPD.

**"Retain views
to countryside
to the west"**

**"Wider pavements
and sensible
crossing points
for disabled users
needed"**

**"How will people
get on and off
the site? There is
gridlock traffic
already along
Fiddler's Lane"**

A1.4 Formal engagement

Introduction

A1.4.1 The six-week formal consultation ran from 13 January 2020 up until 17 February 2020. The public were able to view and comment on the masterplan at any time during the period, by using the online platform set up through Commonplace. There were also four staffed drop-in events held at local venues for people to come along to, to view the masterplan SPD and to talk through the document with the planning team.

A1.4.2 The drop-in events were:

- Thursday 23 January, 12:30pm - 3:30pm, Springbank Community Centre, GL51 0LG
- Thursday 23 January, 4.30pm – 7.30pm, Hester's Way Community Centre, GL51 7SU
- Saturday 1 February, 10.30am – 1.30pm, Regent Arcade, High St, Cheltenham GL50 1JZ
- Saturday 1 February, 2:30pm - 5:30pm Tewkesbury - Cheltenham West Community Fire Station Tewkesbury Road, GL51 9SN

A1.4.3 People who attended the drop-in events were encouraged to leave feedback using the online engagement platform.

A1.4.4 The events and online platform were publicised extensively on the Council's website and social media channels. Flyers were also delivered to those in the local area. The area of focus for the flyer drop is shown on the map opposite. Regular monitoring during the consultation process enabled communication to be directed towards certain groups that were shown to be underrepresented in the feedback.

Online consultation

A1.4.5 Consultation was carried out using Commonplace, an online engagement platform. Proposals were



Figure 3 Formal consultation leaflet distribution area



Figure 4 Screenshot of one of the web pages

split across six pages, five of which included a comment form. The form comprised an 'emoji' sentiment scale and a combination of multiple choice options and free text fields. Respondents were not required to fill in all fields.

A1.4.6 In total, 2979 people visited the website. 157 people gave feedback and 213 comments were made. 191 agreements were made and 78 people subscribed to project news.

A1.4.7 Respondents had the option to give details about their age, ethnicity and postcode. The maps opposite show respondents' postcodes. The number corresponds to the number of respondents from that postcode, and the colour corresponds to the average sentiment of those respondents across all comments they made.

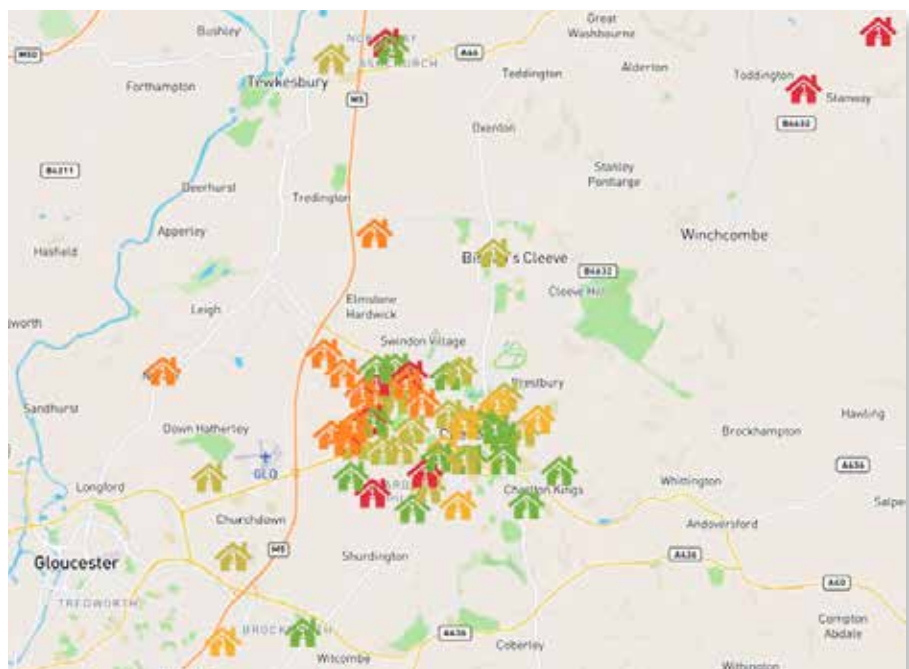


Figure 5 Respondents' postcodes and sentiments

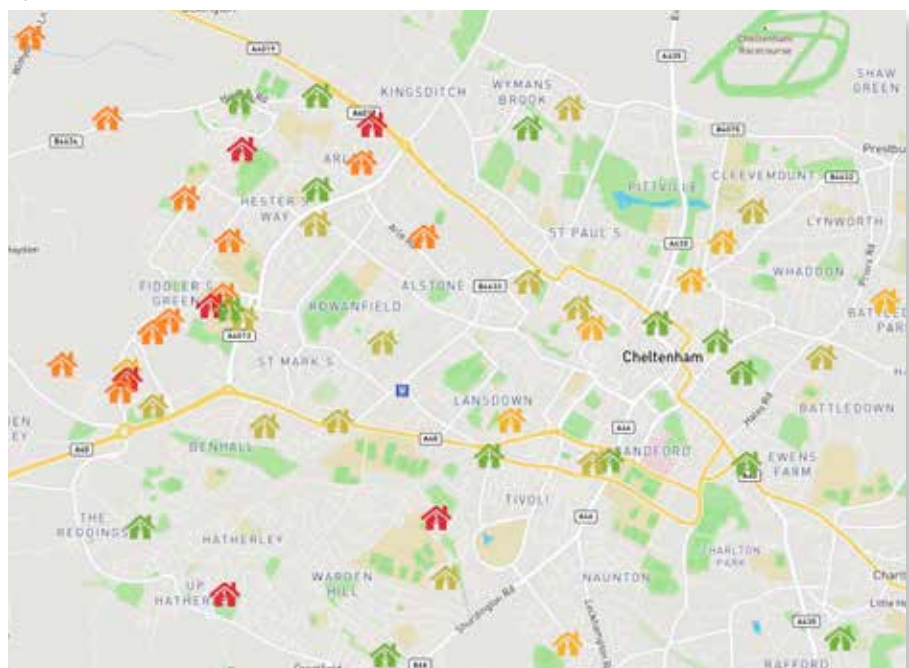


Figure 6 Zoom in of respondent postcodes and sentiments

72%
of respondents
live in the local
area

**45-54
yr olds**
contributed
the biggest %
of responses

Key findings

- A1.4.8 Overall 41.4% are positive or very positive about the masterplan proposals. 41.4% are negative or very negative about the proposals and 17.2% are neutral. People were generally more supportive of the overarching objectives than of more specific area-based proposals.

Vision

- 46.3% either strongly agree or somewhat agree with the vision for The Golden Valley Development. 15.9% of respondents were 'neutral'. 23.2% somewhat disagreed and 14.5% strongly disagreed.
- 26% of people would like to see more emphasis on transport and accessibility in the vision.
- 19% would like to see more emphasis on environmental / design quality, 13% would like to see more emphasis on sustainability, 12% would like to see more emphasis on job creation, and 10% would like to see more emphasis on housing delivery.
- Sustainability was the theme that most people felt should take priority in future decision making as the development comes forward.

Sustainability and land use

- 78.5% strongly or somewhat agree with the sustainability objective.
- 72.7% strongly or somewhat agree with the land use objective.

Landscape and movement

- 75% strongly or somewhat agree with the landscape objective.
- 78.8% strongly or somewhat agree with the movement objective.

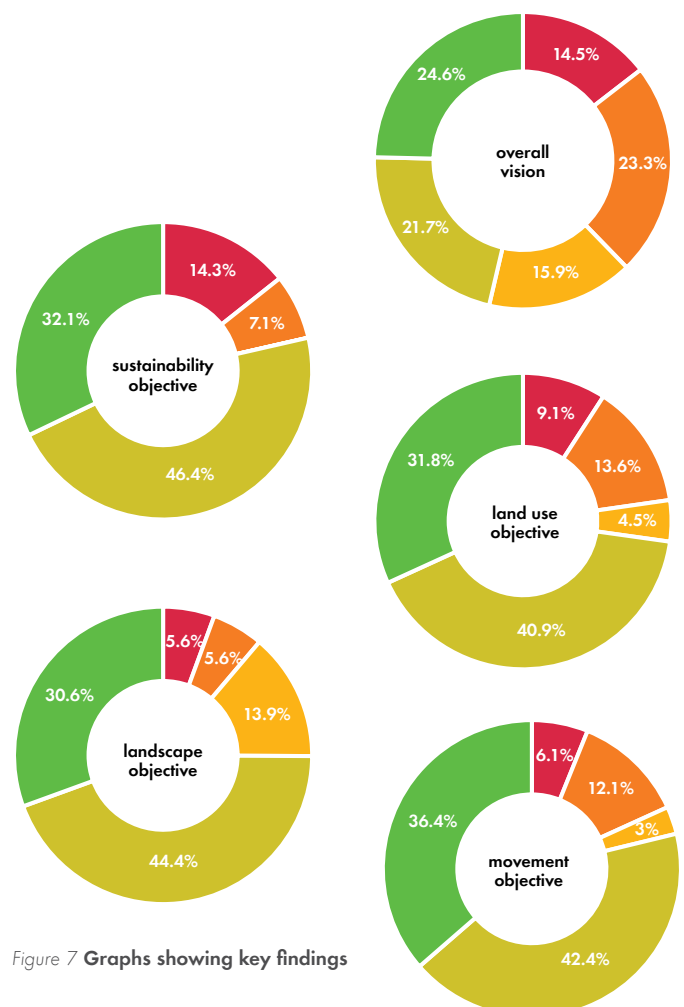
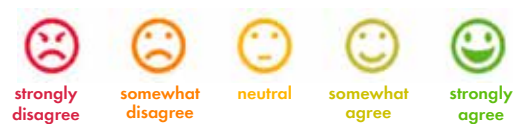


Figure 7 Graphs showing key findings

Placemaking and Design Quality

- 54.6% strongly or somewhat agreed with the vision presented for the different places within Cyber Central. 18.2% strongly disagreed.
- People most strongly disagreed with the location for the focus of Cyber Central at the junction with Telstar Way (27.3% of respondents). Although more people strongly agreed than strongly disagreed. In total, 50% strongly or somewhat agreed.
- 57.2% strongly or somewhat agreed with the proposals for the new link road, Main Street. 19% strongly disagreed.
- 65% strongly or somewhat agreed that the northern areas should have a greater focus for housing and neighbourhoods. Only 5% strongly disagreed, although 20% somewhat disagreed.
- 77.3% strongly or somewhat agreed that new development should be fully integrated with existing community.



Figure 9 Photos of the drop-in events

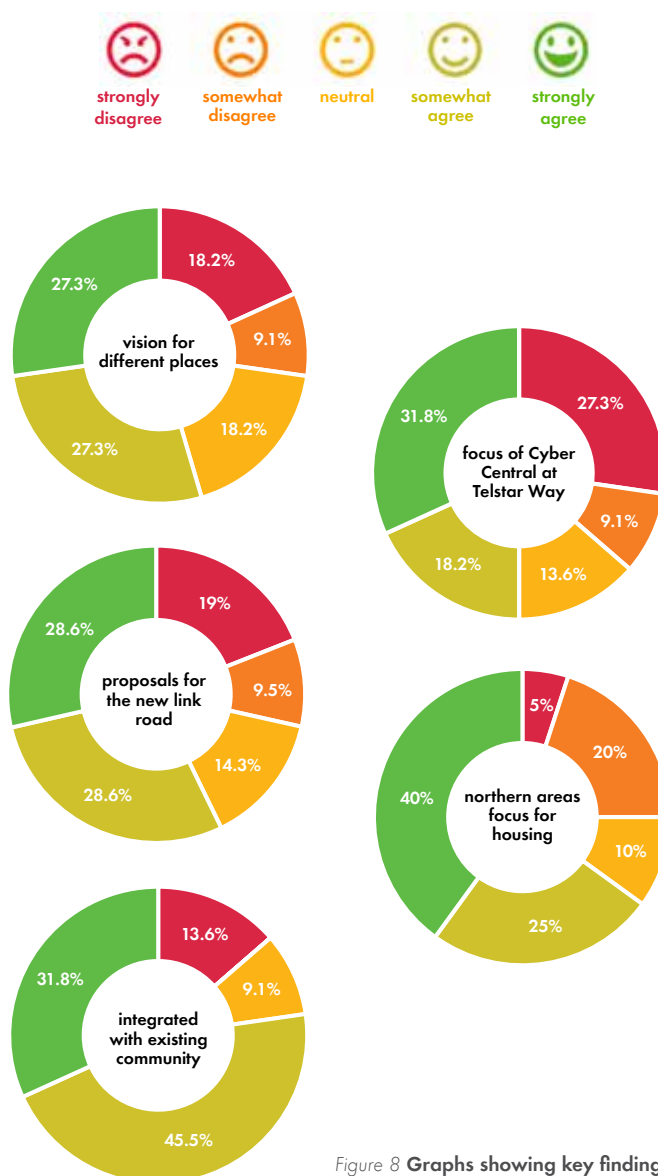


Figure 8 Graphs showing key findings

A1.4.9 Respondents were also able to make more general 'free text' comments under each objective and proposal, including identifying missing elements. A comment tracker was created with a summary of each comment and any proposed changes. Below lists the themes most comments related to:

- Traffic concerns on existing network
- Safety concerns on existing network
- Parking provision on site and nearby
- Low traffic neighbourhoods and encouraging sustainable transport
- Provision of good cycling infrastructure
- M5 junction upgrades
- Local facilities and services, including education provision and opportunities for young people
- Affordable housing
- Design / layout of proposals including proximity of buildings to existing homes
- Tall buildings / density concerns
- Environmental protection and wider environmental impact
- Construction concerns

A1.4.10 Representations were also received from professional stakeholders and statutory consultees in the form of letters to the Council. These were compiled into a comments trackers where over 400 individual comments have been reviewed. Updates to the document have been made in response to the online comments and representations. Some comments made were outside the scope of the masterplan SPD but have been noted by the Council and could feed into other related work.

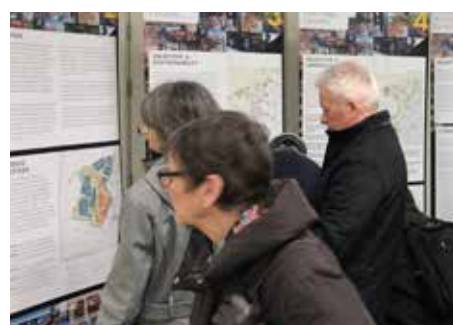


Figure 10 Photos of the drop-in events

A2 Site context

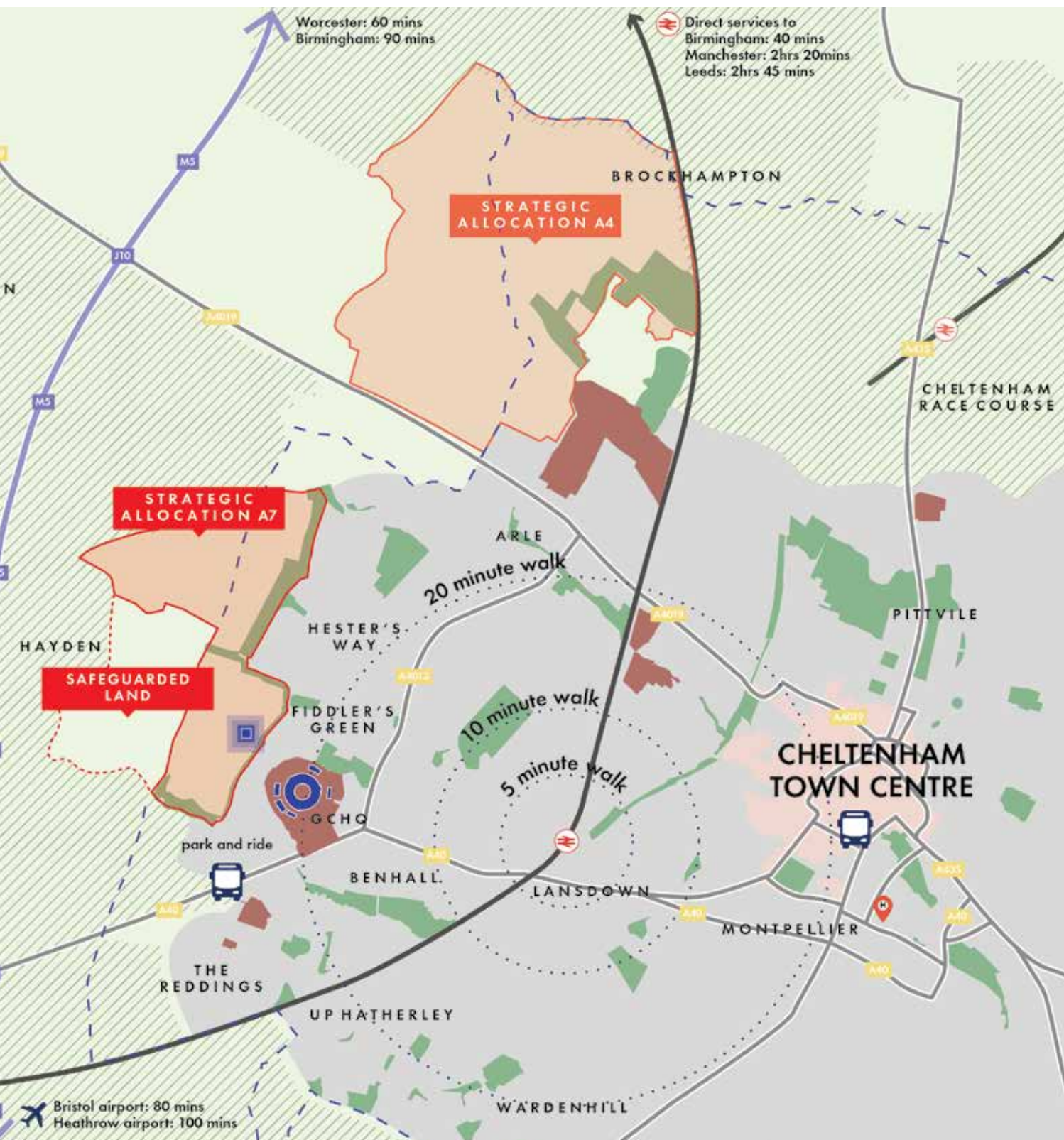
A2.1 Funding related growth context

A2.1.1 The scale and ambition of the vision for The Golden Valley Development has allowed the local authorities to bid for and secure significant public funding for planning and infrastructure. This has been possible through a strong working relationship and collaboration between Cheltenham and Tewkesbury councils, Gloucestershire County Council and GFirst LEP. Collectively this relationship with the support of Homes England are driving the vision for exemplar and connected development. The success of securing funding demonstrates the importance with which the government and other agencies are attaching to this project. Key strategic investments secured or are being sought include:

- GFirst LEP has already secured £22m of Growth Deal 3 funding to provide improvements to the transport infrastructure along the A40 corridor which will enable sufficient capacity to open up the first phase of Cyber Park.
- The government has awarded Garden Community status to CBC and TBC for the West Cheltenham site and provided £150,000 of funding towards planning work.
- The local authorities have made a joint bid to Homes England for funding to upgrade junction 10 of the M5 to an 'all-ways' junction through the Housing Infrastructure Fund (HIF). This bid includes additional improvements to the local network in order to future proof it for the anticipated growth to around 2040.
- In October 2018 Cheltenham Borough Council approved up to £100m to finance capital costs for delivery of new housing by Cheltenham Borough Homes. The proposal agreed by Council was to consider development of a complete range of rental homes from social and affordable through to market and premium rents. Cheltenham Borough Homes are investigating options that will make a contribution to the place shaping agenda at Cyber Central.

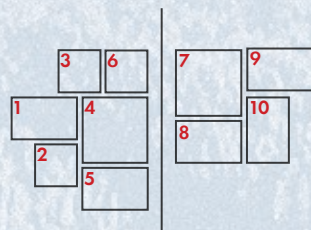


Figure 11 Location of site in the context of other strategic allocations and transport infrastructure



hubs





- 1 View towards the Severn Trent Water's Hayden Sewage Treatment Works on the western fringe of the site
- 2 Recent residential development at Hope Orchard
- 3 Part of the cycle network leading off of Henbury Close that borders the site to the east
- 4 Grazing horses at Holmlea Farm, Fiddler's Green
- 5 View looking east towards the residential edge condition of the neighbourhoods at Hester's Way
- 6 Stile and footpath leading into the site from Beverley Croft that borders the site to the east
- 7 Hatherley Brook running along the south of the site
- 8 Rural track near Hayden's Green
- 9 View looking west towards the Vale Hillocks
- 10 A network of mature hedgerows and trees characterise the field patterns of the site

A2.2 Land ownership

A2.2.1 The Golden Valley Development overall land allocation of 130 Ha (321 acres) falls within a number of different land ownership interests, the majority of which actively worked together through the extensive promotion of the land through the preparation of the Gloucester, Cheltenham and Tewkesbury JCS. At the time of writing there are believed to be numerous main land interests within the site including:

- Cheltenham Borough Council (CBC) has recently completed (August 2019) the purchase of approximately 45 Ha/111 acres of land from the previous owners (The West Cheltenham Consortium). The CBC land comprises two separate land parcels; the north extends to around 18 Ha (45 acres) whilst the southern land comprises about 27 Ha/67 acres. The two land parcels can be seen on the plan opposite (see Figure 12).
- Midlands Land Portfolio Ltd' (MLPL – a Subsidiary of Severn Trent Water PLC) owns 57 ha / 141 acres within the site allocation. Approximately 23 ha / 58 acres of this forms part of a joint venture between 'Northern Trust Company Ltd' (NT) and 'MLPL'.
- Severn Trent Water (STW) also owns the Hayden Sewage Treatment Works (covering 19.3 ha / 48 acres) to the west of the allocation which sits within the 'safeguarded land'. A further 44 ha / 109 acres within the safeguarded land is owned by MLPL.
- A number of further landowners / owner occupier interests control areas within the south, north west and south west corners of the site.

A2.3 Site promotion

- A2.3.1 Earlier masterplanning work was undertaken on the SPD site by a consortium formed between Severn Trent Water as principal landowner and developer partner Northern Trust.
- A2.3.2 The Consortium promoted the site as a strategic development opportunity during the production of the JCS. A significant amount of technical work to assess the engineering and environmental constraints and development capacity of the site was undertaken. Much of this technical work has informed this SPD.

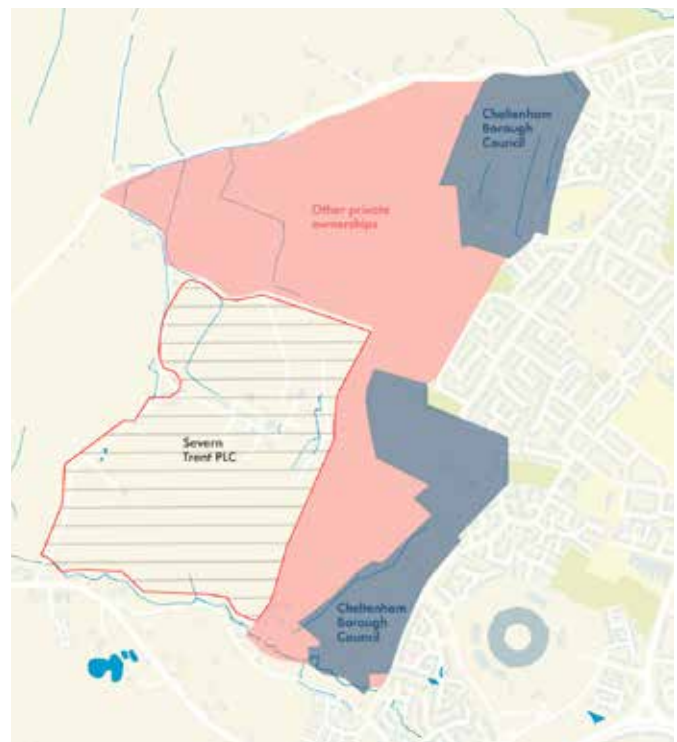


Figure 12 Land ownership plan

A2.4 Policy context

A2.4.1 This SPD should be read alongside the Development Plan which sets the local and strategic planning policy context for the site allocation. Given the cross boundary nature of the site, the documents forming the Development Plan include Plans covering both Cheltenham Borough and Tewkesbury Borough Council administrative areas. Material planning policy considerations therefore comprise the following documents although the weight to be applied to each will vary depending on the document status at the relevant point in time.

2.4.2 Joint Planning Documents:

- The Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (JCS) (adopted December 2017)
- Emerging joint policy documents including the JCS review will also be relevant material planning documents although their material weighting will be dependent on the status at the point in time in which a planning decision is being made.

2.4.3 Cheltenham Borough Council Planning Documents:

- Cheltenham Borough Council Local Plan Adopted 2006 (saved policies).
- The emerging new Cheltenham Plan – at main modifications stage with consultation November 2019.

- Supplementary Planning Guidance including:
 - Affordable Housing (2004)
 - Amenity Space (2003)
 - Sustainable Drainage Systems (2003)
 - Landscaping in New Development (2004)
 - Planning Obligations (2003)
 - Planning Obligations – Transport (2004)
 - Play Space (2004)
 - Public Art (2004)

- Security and Crime Prevention (2003)
- Sustainable Developments (2003)
- Travel Plans (2003)
- Supplementary Planning Documents including Waste Minimisation in Development Projects (September 2006)
- Community Infrastructure Levy (charging commenced January 2019)
- Informal guidance on socially sustainable communities¹ 'Welcome to the future A local model for building socially sustainable communities'.

2.4.4 Tewkesbury Borough Council Planning Documents:

- The adopted Tewkesbury Borough Local Plan to 2011 (saved policies).
- The emerging Tewkesbury Borough Council Local Plan 2011 to 2031 (Pre-Submission version October 2019).
- Supplementary Planning Documents including:
 - Flood and Water Management SPD (February 2018)
- Community Infrastructure Levy (charging commenced January 2019).

¹ https://www.cheltenham.gov.uk/downloads/file/5561/socially_sustainable_communities

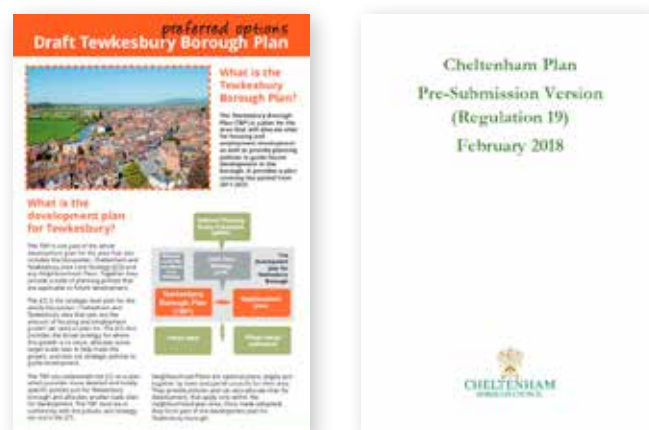


Figure 13 Front covers of policy documents

A2.4.5 This SPD does not set out the above mentioned policy requirements as they can be read in conjunction with this document, however key JCS considerations are repeated below for clarity.

A2.4.6 **Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (JCS)**

A2.4.7 The Golden Valley Development site is allocated under Policy A7 within the Gloucester, Cheltenham and Tewkesbury JCS, adopted in December 2017 which is a co-ordinated strategic development plan that sets out how the area will develop between 2011 and 2031.

A2.4.8 The Allocation A7 proposes approximately 1,100 dwellings and 45 hectares of employment land as listed in the policy text as shown opposite:

A2.4.9 The JCS also sets an affordable housing requirement for the strategic sites through policy SD12 which seeks a 35% provision on site which is below the 40% requirement for proposals on non-strategic sites. This lower proportion takes account of the significant infrastructure investment required to bring the site forward for development.

JCS Review

A2.4.10 Following on from adoption, the JCS authorities have already started the review process. An Issues and Options consultation took place between 12th November 2018 and 11th January 2019. Consensus arising from this consultation is that the review should look to an end date of 2040. This is consistent with the National Planning Policy Framework (2019) which states that strategic policies should look ahead at least 15 years from the point of adoption. This is to anticipate and respond to long-term requirements and opportunities, such as those arising from major improvements in infrastructure. Early consultation on the JCS Review is anticipated to take place early in 2020, with adoption in 2021.

POLICY A7 - WEST CHELTENHAM

The Strategic Allocation identified at West Cheltenham (as shown on Policies Map Plan A7) will be expected to deliver:

- 1 Approximately 1,100 new homes;
- 2 Approximately 45 hectares of B-class led employment land to be focussed upon a cyber security hub and other high technology and high 'Gross Value Added' generating development and ancillary employment uses;
- 3 All development should be employment led, delivery of housing must be in tandem with employment development;
- 4 A comprehensive masterplan and development strategy for the Strategic Allocation, set within the context of the safeguarded land at West Cheltenham, which includes:
 - a) A delivery strategy for employment focussed land release
 - b) A positive impact on the regeneration of neighbourhoods in west Cheltenham
 - c) Integrates built form and a comprehensive network of accessible green infrastructure, including local green space. The network will incorporate and protect notable natural features, including the Hatherley Brook, the Fiddler's Green Local Wildlife Site and important trees and hedgerows, and contribute to water quality enhancements.
- 5 Vehicle accesses from Fiddlers Green Lane and B4634 Old Gloucester Road and facilitate links to the M5 J10 for strategic movements to and from the site;
- 6 Measures necessary to mitigate the traffic impact of the site, including the use of travel plans to encourage the use of sustainable transport modes;
- 7 High quality public transport facilities and connections within and adjacent to the site.
- 8 Safe, easy and convenient pedestrian and cycle links within the site, to key centres and with neighbouring existing development and the wider green infrastructure network;
- 9 A distribution of development that takes account of the proximity of the Hayden sewage treatment works and incorporates appropriate spatial planning arrangements and mitigation measures designed to minimise material impacts on residential properties and commercial premises. Development which is likely to be significantly affected by odours will not be permitted within the Odour Monitoring Zone identified on the policies map;
- 10 A landscape buffer to the western boundary of the site which will provide screening between the development and the Hayden sewage treatment works;
- 11 A layout and form that respects landscape character, significance and setting of the heritage assets at Hayden Farmhouse and Barn;
- 12 A layout and form that reduces the impact of electricity pylons and high voltage lines; with the siting of residential development being a particular consideration.

A2.4.11 The JCS Review Issues and Options document notes that planning over a longer plan period will mean an increased requirement for new homes, employment and infrastructure, and the need to look at further locations for growth. The JCS process pre-empted this requirement through the identification of 'safeguarded land' adjacent to both the West and North West Cheltenham strategic sites that has been removed from the Green Belt in order to meet the longer term development needs beyond the current plan period. In the case of Cyber Central this 'safeguarded land' includes the Hayden Sewerage Treatment Works and land immediately to the west of the Cyber Central site.

A2.4.12 The Review Issues and Options document identifies that areas including the extension of the Cyber Central allocation provide the primary opportunity for helping to meet the growth requirements for Cheltenham but these sites need to be planned through a review in order for them to come forward. The Review Issues and Options also notes that in addition to the safeguarded land, there are potentially other opportunities within the wider West Cheltenham area that are currently within the Green Belt but which could provide further sustainable options for growth. In addition the consultation document recognised that further development in this area would provide the opportunity to build on the development of the existing strategic allocations and take advantage of social and community infrastructure that is to be provided. At Cyber Central, development beyond the current allocation would also help maximise the potential of the cyber security hub. In seeking to demonstrate this proposition, the JCS Review process is supported by a number of background documents including the Cyber Central Vision.

Neighbourhood Plans

A2.4.13 Within Cheltenham Borough, the Springbank Neighbourhood Forum Area (approved by Cheltenham Borough Council June 2017) and Hester's Way Neighbourhood Forum Areas (approved by CBC December 2017) between them include the subject site.. If prepared, Neighbourhood Plans will need to be in general conformity with the development strategy and policies set out in the JCS and other plan documents. Hester's Way Forum is currently in the process of preparing a Neighbourhood Plan that is well advanced. There is currently no plan for preparation of a Neighbourhood Plan by the Springbank Forum. There are no known applications for Neighbourhood Plans within the Tewkesbury Borough area relevant to the site at the time of writing.

Waste and Minerals Plans

A2.4.14 Consideration will also need to be given to the adopted Gloucestershire Waste Core Strategy, particularly policy WCS 2 Waste Reduction, and WCS 11 Safeguarding Sites for Waste Management. The emerging Minerals Local Plan for Gloucestershire has recently been examined and the main modifications consultation has recently ended. If adopted, Policy SR01 is concerned with the delivery of sustainable construction and is focused on maximising the amount of secondary and recycled aggregate being used in development projects throughout the County. If adopted, emerging Policy MS01 Non-mineral developments within MSA should also be acknowledged. Part of the proposed SPD area falls within in a designated Minerals Consultation Area (MCA). Proposed development taking place within the MCA area could potentially require a Minerals Resource Assessment (MRA). Local advice on MRAs is contained in the supporting text to Policy MS01.



Figure 17 **The Royal Wells, Cheltenham or Spasmodic affections from Spa Waters** by Isaac Rober Cruikshank (1825) ©Collection of the Art Fund, Inc. at the Birmingham Museum of Art; Catherine H. Collins Collection, AFI.668.1998

A2.5 Cheltenham's next phase of growth

Site history and local heritage

A2.5.1 The study area was mainly surrounded by farmland up until the late 20th century when Cheltenham rapidly expanded westwards. Many of its historic lanes, footpaths and field boundaries are still evident today and connected Hayden with Hester's Way and Pilgrove farms. The historic maps below (Figure 14 -16) show these features, including some that have since been lost, for example the path from Pilgrove Cottage to Golden Valley. Development of the residential areas on the eastern edge of the site have respected the early field boundaries.

A2.5.2 A Scheduled Monument known as 'Moat House moated site' is located to the north of the site. To the west are three grade II listed buildings - Hayden Farmhouse, a barn, and The Old Forge. To the south is Nesley Croft, a Grade II Listed building.

The growth of Cheltenham

A2.5.3 The development of West Cheltenham continues the town's story of expansion, illustrated in Figure 18. Cheltenham has Saxon origins which centred on the present High Street and adjoining lanes. The town became a prosperous spa resort following the discovery of medicinal waters in 1716. Villas and terraces were built along tree-lined walks.

A2.5.4 The town's population grew rapidly in the 19th century. Cheltenham developed into a major shopping centre and the opening of the railway in 1840 spurred the development of estates. By 1903, Cheltenham was a religious and education centre with several important colleges and schools located to the south. The opening of hospitals, parks, bath-houses, an opera house, library and theatre, supported the growing population, although no firm economic base for the town meant high levels of unemployment and vacant houses. The population declined drastically between 1901 and 1921, and Cheltenham became known as 'the town to let'.

A2.5.5 Its fortunes began to change in the 1930s with the growth of aeronautical industries and pharmaceutical and foodstuffs companies. GCHQ relocated to Cheltenham in the 1950s and housing was built for its employees. Since then, the town has seen continued residential expansion to the west. Cheltenham is the location of several head offices, including UCAS and Rural England, and tourism is playing an increasingly important role. The development of Cyber Central West Cheltenham aims to strengthen the town's reputation as the national leader of cyber technologies.



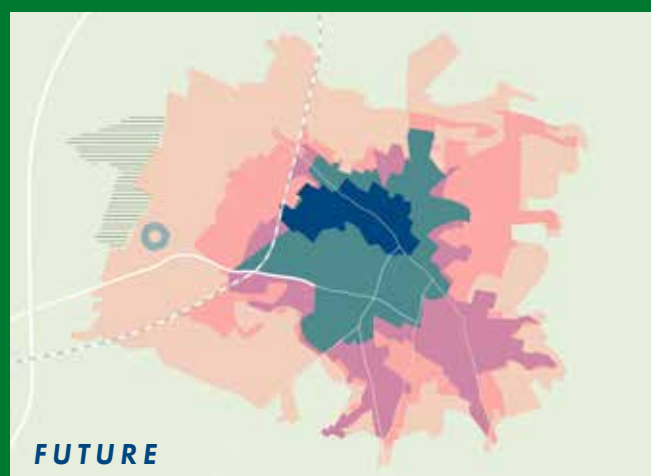
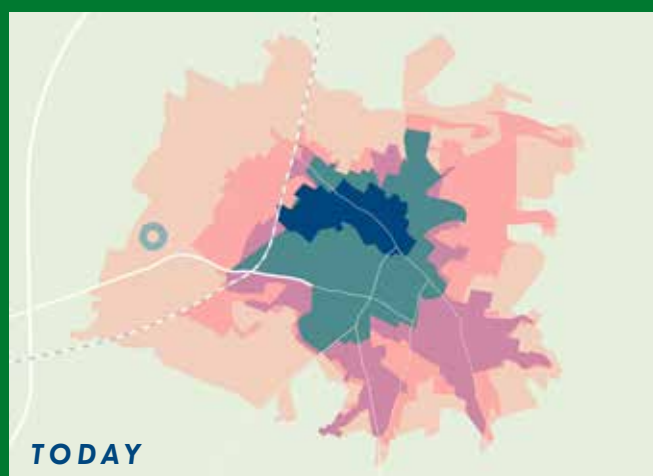
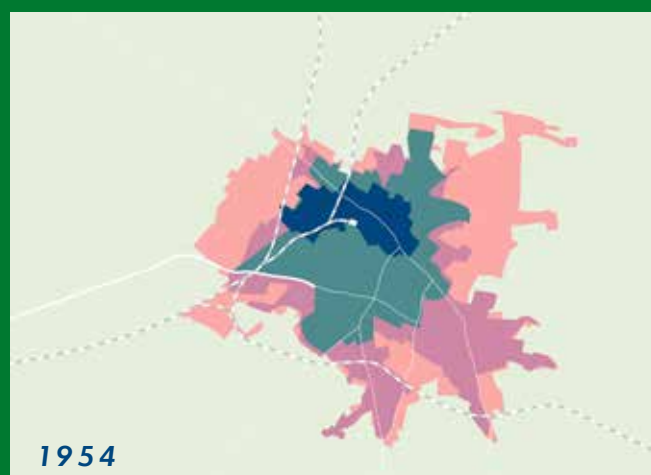
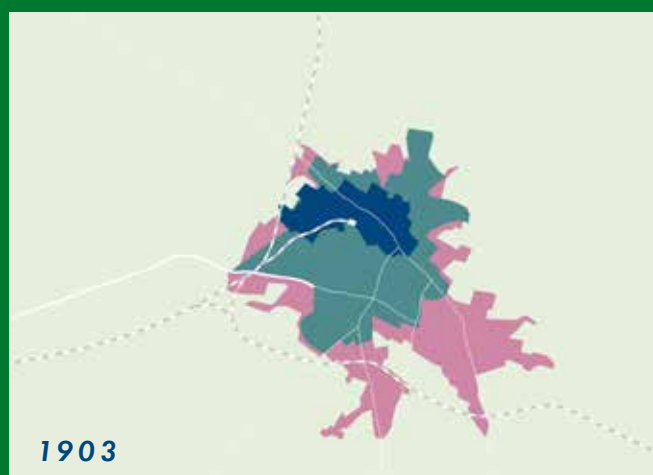
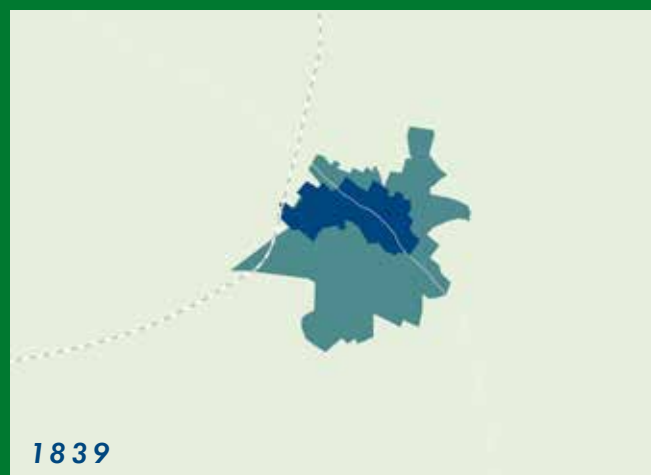
Figure 14 1888 Ordnance Survey ©NLS



Figure 15 1901 Ordnance Survey ©NLS



Figure 16 1954 Ordnance Survey ©NLS



THE GROWTH OF CHELTENHAM

Figure 18 Historic evolution of Cheltenham Town Centre



A2.6 Transport context

A2.6.1 During the preparation of this SPD the Cabinet of Cheltenham Borough Council has approved 'Connecting Cheltenham', a transport strategy for the borough. This strategy sets clear ambitions for modal shift and provides context for this SPD. The following section makes commentary on the current transport context, opportunities for delivery through new development is set out in Part B of this SPD.

Walking and cycling

A2.6.2 There is a footway / cycleway provided adjacent to the carriageway on Telstar Way to the south of the site which links to an off-carriageway walking / cycling route adjacent to the A40. This route ceases to the east of Telstar Way and commences again from Princess Elizabeth Way. As such, there is the potential for extending the route adjacent to the missing section along the A40.

A2.6.3 To the north of the site, there are no footways on Old Gloucester Road adjacent to the site boundary, although a footway is provided which links from Pilgrove Way. To the east of the site, within the existing residential areas, footways are provided on all local residential streets providing a highly permeable environment for pedestrians.

A2.6.4 There is limited cycling infrastructure or routes linking through the existing Springbank and Rowanfield residential areas, however most of the routes are considered to be quiet roads and therefore suitable for cycling. This supports the wider ambition of Cheltenham Borough Council to double cycle trips, as set out in the Connecting Cheltenham transport strategy. The site has the potential to connect to a number of cycle routes via Telstar Way, along Princess Elizabeth Way and the A40 as well as further afield along the Honeybourne Line. These could be linked through the existing residential areas in Springbank via a number of connection points and include signage and road markings, as appropriate.

A2.6.5 National Cycle Route 41 runs directly to the southern boundary of the site and provides a cycling link between Gloucester and Cheltenham. This is a mixture of an on and off-carriageway route and offers the potential for travel to and from the site via cycle.

A2.6.6 There is a good network of walking and cycling routes linking to the site which the masterplan can connect into and enhance. Improvements could be made along Old Gloucester Road to provide a footway linking to the northeast, where needed.

Public Rights of Way (PRoW)

A2.6.7 Figure 20 shows the existing PRoW within and around the West Cheltenham allocation site. Some routes traverse the site and should be taken into consideration in any masterplanning for the site as a whole and particularly in the green infrastructure strategy.

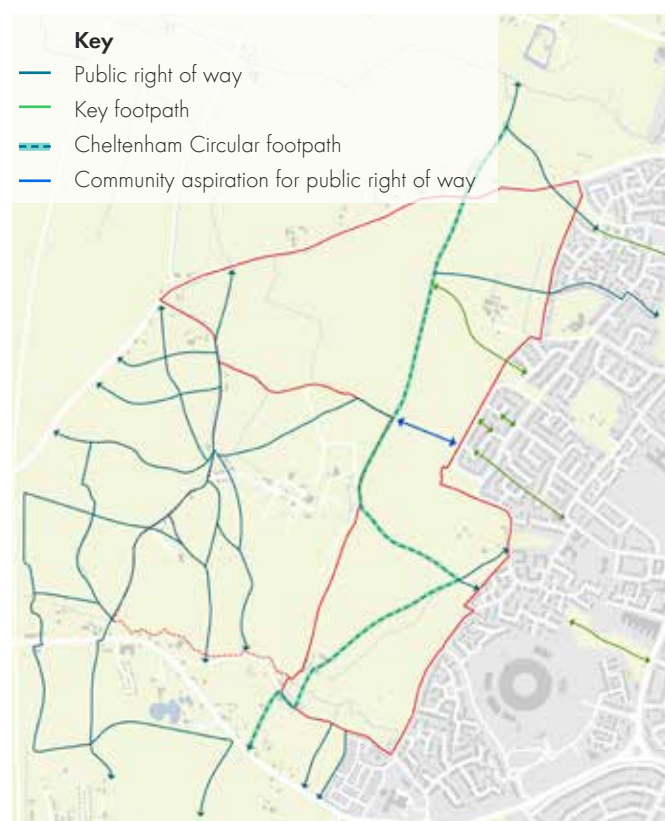


Figure 20 Public Rights of Way in West Cheltenham

A2.6.8 Early informal consultation with the local community has also highlighted an aspiration to improve the PRoW network between Springbank and the existing cross-site network. These potential extensions to the PRoW network are also shown in Figure 200.

Public transport

A2.6.9 The closest bus routes operating within the vicinity of the site are the 94 Gold, Service H, C and A, as shown in Figure 2121 and as follows:

- The 94 Gold provides a 10 minute frequency of service between Cheltenham and Gloucester and stops within a reasonable proximity of the Cheltenham Rail Station and passes to the south of the site.
- Service H connects the Town Centre to Swindon Village and Arle Farm to the north of the site. This runs with a 30 minute frequency.
- Service C connects the Town Centre to Kingsditch and Springbank to the east of the site. This runs with a 15 minute frequency of service.

A2.6.10 Gloucestershire County Council has made a bid to Homes England to fund a multi-million pound investment in transport infrastructure. The funding would provide an upgrade of M5 junction 10 with the new junction giving access from the motorway both northbound and southbound to a new link road into Cheltenham which would link to The Golden Valley Development site. The link road would be dual carriageway in nature and connect to the northern end of The Golden Valley Development site and need to tie into the main access road.

A2.6.11 The junction may also offer some capacity benefits at Junction 11 as vehicles would not need to divert to J11 to travel to and from the M5 south. There will be significant improvements for Princess Elizabeth Way as vehicles currently using this route to access junction 11 from the north of the

town, (notably HGV's from Kingsditch), will be removed.

Strategic development and movement context

Elms Park

A2.6.12 The Elms Park development is located to the north of the SPD site, on the north side of the Tewkesbury Road. The principal roads within the site are proposed to have carriageways widths of 7.3 metres, with anticipated traffic levels to be c. 2,200 movements per hour across the four access points.

A2.6.13 The Elms Park development at North West Cheltenham also proposes significant improvements along the Tewkesbury Road corridor for buses and cyclist access. There are minimal opportunities for improving the operational capacity of junctions and as such, the key focus of their transport strategy is to encourage sustainable travel and a modal shift to alternative modes for existing users. The majority of mitigation proposals are therefore for sustainable transport improvements.

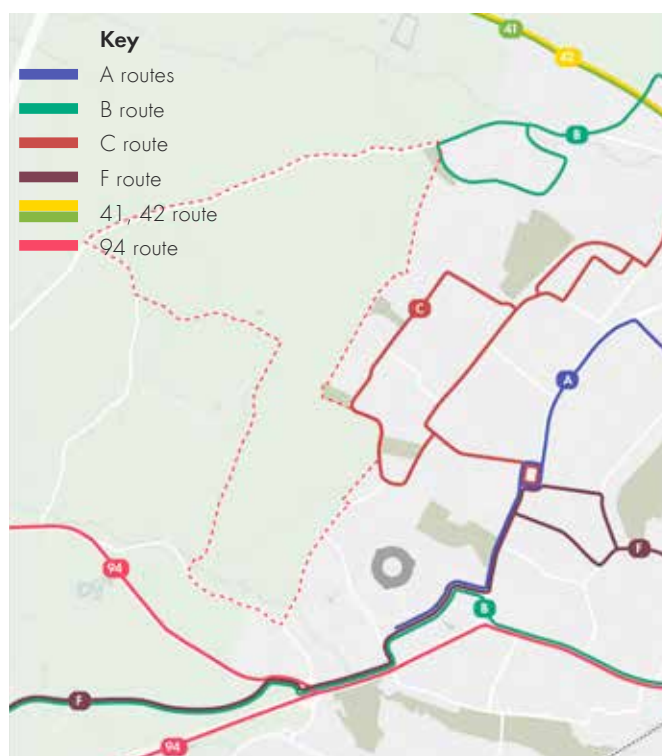


Figure 21 Existing bus routes serving West Cheltenham

West Cheltenham - JCS evidence

- A2.6.14 A considerable amount of transport work was done in order to promote the site through the JCS process. Modelling was undertaken, junctions designed, and a network of roads was envisaged to provide access across the site as a whole. Transport constraints and highways capacity considerations will play an important role in the design of development proposals coming forward and the approval of the highway authority will be required.
- A2.6.15 However, the scale of the site presents a unique opportunity to ensure priority is given to both improving public transport connections to surrounding stations and centres, and putting infrastructure in place to support more sustainable patterns of travel for those who live in, work in, and visit the area.

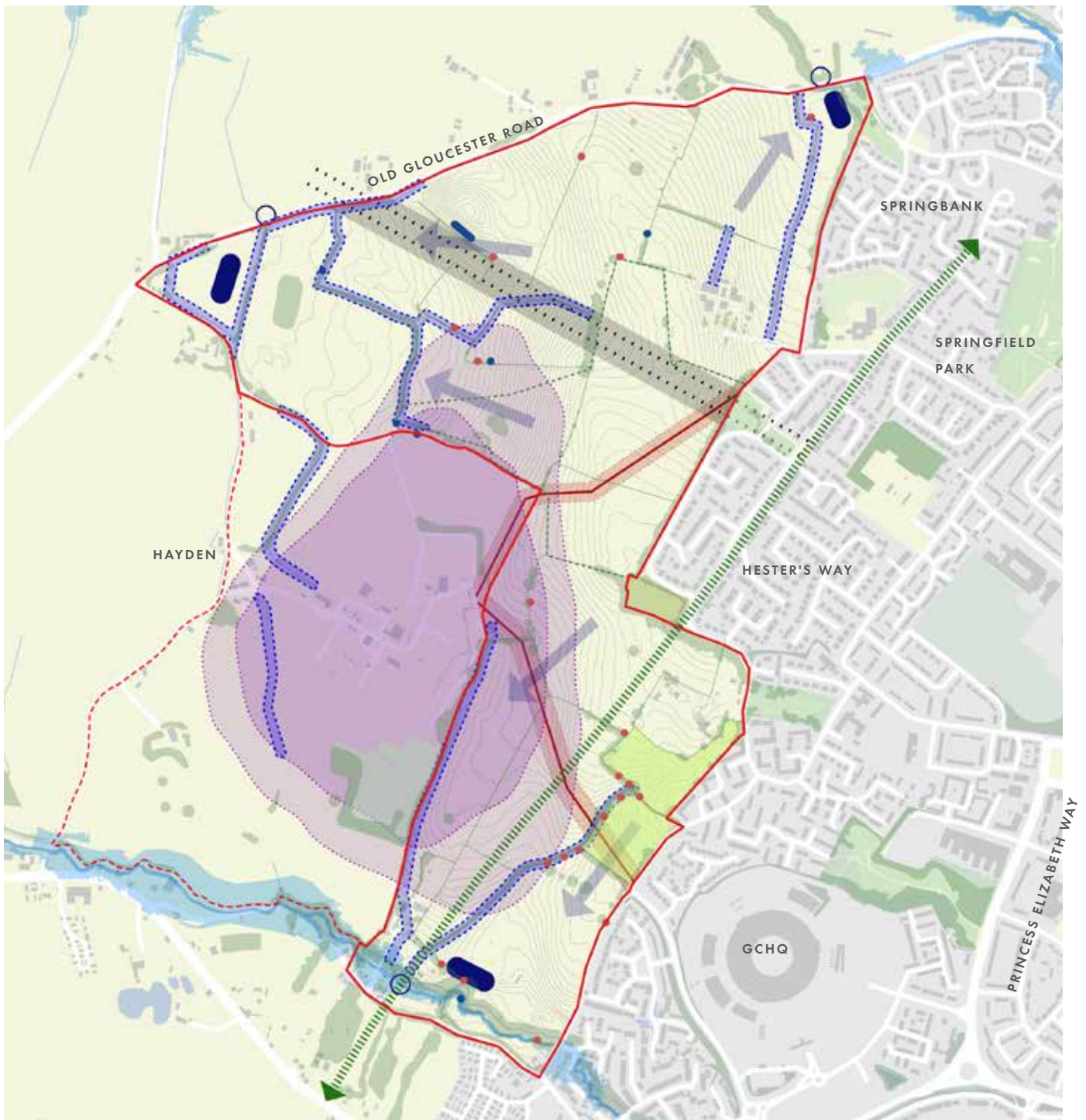


Figure 22 Summary constraints plan

Key

- Badgers
- Bats
- Mature trees
- Community space allocation
- Hedgerows
- Allotments
- Grassland habitat
- waterways
- water attenuation areas
- ← catchment drainage direction
- fluvial / surface flood zones
- Trunk main
- 20m easement to surface water outfall
- Power lines
- Cordon sanitair
- Foul sewer

A2.7 Opportunities and Constraints

A2.7.1 Technical due diligence, across the site for a range of disciplines, has underpinned the preparation of this SPD. This has shown that generally the site has very few abnormal constraints. A brief non-technical summary of each discipline is presented below. See Appendix A3 for more information.

A2.7.2 Detailed information to support a HRA (Habitat Regulations Assessment) will be required as part of the planning application process. The main potential impacts on European Sites are increased recreational disturbance, plus reduced water and air quality.

Acoustics

A2.7.3 As expected for a greenfield site the noise constraints are fairly limited. It is worth noting that there may be some noise associated with the M5 running to the west of the site and particularly apparent in the north western corner of the site where the M5 is at its closet. Standard mitigation measures such as noise barriers or earth bunds may be required locally.

Air quality

A2.7.4 Around the site average background NO₂ concentrations are low and the locations of the planned residential plots are set back from the roads, so likely NO₂ concentrations will remain low. We know that there are elevated concentrations of NO₂ locally to the site and therefore, dwellings near B4634 may need to be set back from the road slightly to reduce air quality impacts from road traffic. There is an opportunity for a site wide Green Infrastructure Strategy to consider air quality issues.

Ecology

A2.7.5 Despite being a greenfield site, ecological constraints are fairly limited. There are European statutory sites within 10km and two National Statutory sites within 2km.

A2.7.6 In 2017 the Cheltenham Borough Council scoping opinion notes the requirements needed for assessing impacts on statutory and non-statutory sites. It also highlights the requirement to demonstrate that there is no deterioration in terms of water quality or ecological value of known watercourses.

A2.7.7 There are numerous opportunities to improve the current ecological baseline and provide biodiversity net gain at this development. There is also an opportunity for ecological connectivity to be improved and integrated as part of the site wide Green Infrastructure Strategy.

Flood and drainage

A2.7.8 The proposed site forms three drainage basins, with the highest ground in the centre of the site.

A2.7.9 Almost all of the site is in Flood Zone 1, which is the lowest risk in relation to rivers and sea. There is a narrow floodplain at the southern boundary near Hatherly Brook which is recommended to stay undeveloped.

A2.7.10 With regards to surface water flooding, the north western corner of the site is considered to be highest risk, however does not consider culverts so is a worst-case scenario.

A2.7.11 As it stands, there is no physical conflict with sewage works and proximity to pipes exist, however there may need to be discussions with Severn Trent Water to check if the capacity of the existing sewers is enough to support a new development of this size.

A2.7.12 Due to mudstone geology, runoff via infiltration will not be feasible, therefore the site should discharge to local watercourses at the pre-development 'greenfield' rate. Space for this should be allocated within the layout, downslope of development.

A2.7.13 Areas of low-lying ground provide opportunity to create marsh or wetland areas especially when combined with onsite attenuation requirements. This could be integrated as part of the site wide Green Infrastructure Strategy.

Geoenvironmental and geotechnical

A2.7.14 There are considered to be limited risk areas for contaminated ground to be suspected. Areas most likely to have elevated risks are at the old farmhouses around site. Given the scale of the site it is likely that ground conditions will vary across the developable area. Low-lying areas may also present a risk of soft soils leading to deeper foundations and consideration given to the stability of excavations.

A2.7.15 A phased approach for geoenvironmental and geotechnical work is required, focusing on two stages of planning application and then a master planning and development stage. This would include a full phase 1 desk study, and then a phase 2 ground investigation. UXO risk is moderate.

A2.7.16 Further work will be needed, including trial pits in order to determine the soil resource across the site. This will inform appropriate SuDS and planting design for planning, and latterly to understand the potential for re-use in the landscape, and subsequent soil protection measures. Alternatively there could be a stand alone soil survey.

Odour

A2.7.17 This is one of the more influential constraints. As stated at para 4.5.28 of the JCS, the designation of the Odour Monitoring Zone in the JCS at West Cheltenham does not prevent development at the West Cheltenham Strategic Allocation except where such development would be significantly affected by odours. Further work through the

master planning of the development along with appropriate mitigation will facilitate the development of the site. Decision takers should weigh the evidence presented as to the impact of odour on a particular proposal in this area, taking into account Policy SD14 Health and Environmental Quality of the JCS, and relevant advice from the Environment Agency or other expert body.

A2.7.18 There is a requirement that commercial buildings within close proximity to the sewage treatment plant will need some form of mitigation. However, further work would be required to support any forthcoming planning application as this constraint is likely to have a direct impact on any masterplan for the site and, in particular, the location of residential and mixed-use development.

Utilities

A2.7.19 Severn Trent Water 21 inch trunk main runs through the south of the site. Assuming this is not diverted, there will be a requirement for appropriate easement. The masterplan for the site will need to respect the alignment of the HV overheads which traverse the northern part of the site.

A2.7.20 Services around the proposed north and south accesses will be impacted. However due to there being infrastructure in the area there is no issue with connecting the new development up to local networks.

Archaeology

A2.7.21 The JCS Historic Environment Assessment (Addendum - Additional Site Assessments, ECUS September 2016) and previous EIA scoping advice for the allocated area (17/00967/SCOPE) have stressed the need for a programme of archaeological assessment and field evaluation, which describes the significance of any archaeological remains present on the site and how these would be affected by the construction of proposed development, in accordance with the NPPF, paragraph 189, and JCS Policy SD8: Historic Environment.

A3 Longer term phases of growth - Hayden Works site

A3.1 Introduction

A3.1.1 Through the adoption in December 2017 of the JCS, the Hayden Sewage Treatment Works (HSTW) site, whilst not forming part of the West Cheltenham strategic allocation under Policy A7, was removed from the Green Belt and earmarked as 'safeguarded land'. This policy shift was made in view of the longer-term opportunity to bring the works site forward for redevelopment as part of The Golden Valley Development. This site will be tested through the JCS review as a site allocation.

A3.1.2 To bring forward the Hayden Works site as a strategic allocation the existing operational treatment works would need to be suitably relocated. This would be an expensive and complex operation, but if a suitable and a viable alternative location can be agreed and the replacement facility is made operational in advance, the release of this site for redevelopment would potentially deliver significant benefits. Further technical assessments (such as Odour Modelling and Contamination Assessments) will be required to aid the delivery of the allocated land. It is accepted that the delivery of homes and employment space on the allocated land will come forward well in advance of that on the safeguarded land. Appropriate provision of infrastructure must therefore be considered at a wider strategic level. Any development that does come forward whilst HSTW is still operational must take proper account of the operational needs of Hayden Works and the impact of associated odour on proposed new development.

A3.1.3 Principles set out in Part B of the SPD shall inform the delivery of development on the 'wider site' should the safeguarded land be released for development, potentially delivering circa 3,000 homes and 50ha employment land over both the

strategic allocation and the safeguarded land as a whole.

A3.1.4 Redevelopment of the works site at Hayden would contribute positively to many of the key objectives for The Golden Valley Development. Reflecting on each the key objectives outlined in the SPD, this Appendix provides an overview of the positive contribution redevelopment of the HSTW site could make to The Golden Valley Development. Should this site opportunity come forward for development earlier than expected, any new development must be fully considered and tested against the context of the policy requirements set for the wider existing allocation including the SPD. Furthermore, at whichever time the HSTW site does come forward, new development is expected to conform to the design principles set out in the SPD.

The adjacent plan is numbered to highlight some of the key points relating to the longer term phases of growth for the Golden Valley Development, as follows:

- 1 A natural extension of The Golden Valley Development, with one principal road but two access points. This principal vehicular route would be suitable for bus services.
- 2 Landscape features will provide high quality landscape setting between different phases of development and help to reduce the impact of the redevelopment of the Hayden Works site on adjacent residents.
- 3 A permeable network of routes will provide access to all parts of the development and help to shorten walking distances between destinations thereby helping to encourage active and sustainable travel choices.
- 4 Access for pedestrian and cycles only will be possible via Hayden Lane. There will be no car access to the redevelopment via Hayden Lane.
- 5 New development should respect the rural character and scale of Hayden Village.
- 6 Hayden Knoll farm house is retained, with development to respect the setting and amenity of this existing building.

Key

- Site boundary
- Water
- Existing building
- Potential bus junction
- Potential bus access point
- Routes
- Bus gate



Figure 23 Illustrative masterplan - longer term phases of growth at Hayden Sewage Treatment works site (an illustrative framework and not a blueprint for development)

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Ordnance Survey 0100031673

A3.2 Key principles for Hayden Sewage Treatment Works site

SUSTAINABILITY - Embracing the highest standards of environmental sustainability

A3.2.1 Redevelopment of the HSTW site does present exciting opportunities to continue a further phase of growth within The Golden Valley. The latest technologies should be employed to reduce water and energy consumption of new development and deliver net carbon neutral development, and the Smart Cities objectives within this SPD should be considered incorporated for the HSTW site.

A3.2.2 LANDSCAPE - Working with the natural landscape and its features

A3.2.3 Earlier phases of development are likely to have put a landscape structure in place which forms the basis of the establishment of a country park on the western side of the site. The availability of the HSTW site will underpin the establishment of a country park. Existing landscape assets and features will be retained where possible to help influence the form of development. In particular, existing hedgerows, trees and the mature features along the Hatherley Brook should be retained to help ensure new development is appropriately integrated with existing communities.

MOVEMENT - An integrated and connected extension of West Cheltenham

A3.2.4 A permeable and connected network of streets and lanes will allow the later development of the HSTW site to be fully integrated with the development at The Golden Valley Development. Key vehicular routes and cycle connections will extend from the existing network of routes within phase 1 of the development. New communities within the site will benefit from infrastructure which supports active and sustainable travel choices. New dwellings will be supported by vehicle charging points, which will be designed to have dedicated space

for bicycle storage and will have access to the use of environmentally friendly vehicle hire schemes. The area will also be served by appropriate extensions to the local bus services.

LAND USES - A vibrant and diverse range of uses and activities, serving existing and new communities

A3.2.5 This objective is not directly relevant to the HSTW site and it is acknowledged that the relocation of the HSTW will be of significant cost and therefore any alternative uses are likely to be residential led in order to generate the required land values. The cluster of cyber-tech uses will be concentrated on The Golden Valley Development allocated site. Street design will incorporate sustainable drainage features to ensure flood resilience. New development will be designed to high energy and efficiency standards.

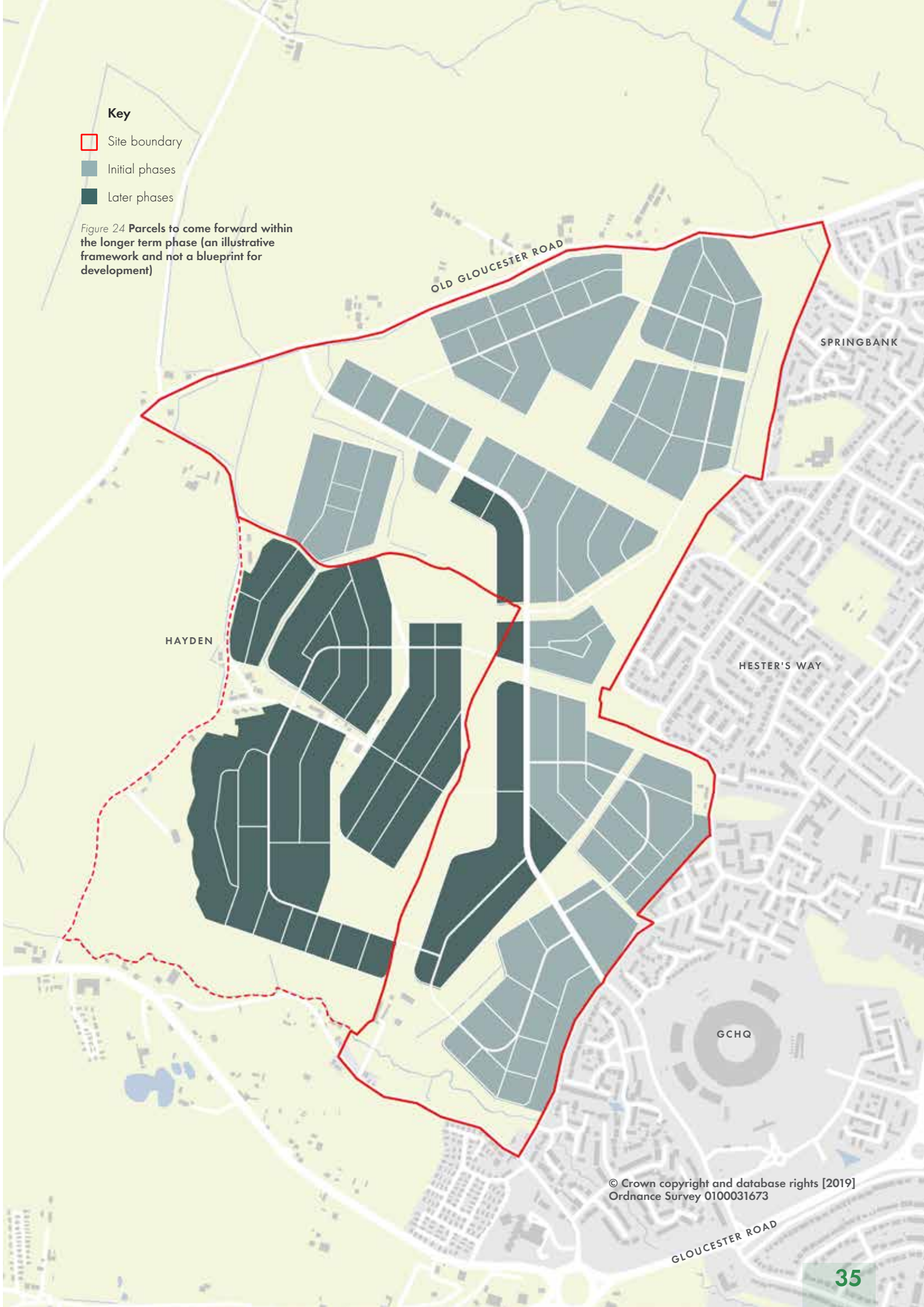
A3.2.6 The design quality of both the houses and the public realm and landscape context of development across the HSTW site will be of paramount importance to its long-term environment, social and economic success and sustainability. Garden communities principles, which have underpinned the development of the core Golden Valley Development SPD site, will be applied to the design of new housing neighbourhoods across the HSTW site. Fundamental to this is the application of good urban design principles which include creating safe and accessible streets and neighbourhoods, a clear distinction between public and private land, developments which create strong street edges which ensure public spaces are overlooked, and a mix of dwelling types and tenure to meet local needs.

A3.2.7 The plan opposite highlights the distinction between shorter and longer term phases of development. Shorter term phases are likely to be able to be brought forward ahead of any prospective HSTW relocation. The later phases of development - some of which fall within the already allocated site - are likely to be dependant on relocation of this facility.

Key

- Site boundary
- Initial phases
- Later phases

Figure 24 **Parcels to come forward within the longer term phase (an illustrative framework and not a blueprint for development)**



A4 Site capacity study

A4.1 Estaimting housing capacity

- A4.1.1 The Adopted JCS, under Policy A7, allocated the site for a mixed use development involving approximately 1,100 new dwellings and approximately 45 ha of employment land.
- A4.1.2 This number of homes was a high level estimate of the site's housing capacity. The Strategic Assessment Land Availability (SALA) methodology is that for sites above 2ha a discount of 37% of the overall land area is made to take account of the land take required for infrastructure. The total size area of allocation Site A7 (not including safeguarded land) is approximately 132 ha, of which 45 ha is earmarked fro employment uses under the provisions on the adopted policy. Once the land required for employment and infrastructure to taken from the 132 ha area, the residual area of land is 55 Ha. An assumed and conservative housing density of 20 dph was assigned to this 55 ha of housing land which accounts for the approximate policy provision of 1,100 dewllings.
- A4.1.3 The preparation of The Golden Valley SPD provided the opportunity of this approximate housing capacity to be assessed in more detail. The masterplan framework presented in the main SPD document presents an illustrative street and green infrastructure network which define a network of development land parcels.
- A4.1.4 These parcels have been measured and land uses and development densities can be applied to them in order to provide an indicative development capacity.
- A4.1.5 The plan opposite provides a summary of the capacity testing exercise undertaken during the preparation of the Golden Valley Development SPD. The assessment looks across both the allocated and safeguarded land.
- A4.1.6 The assessment finds the allocated site to have an indicative approximate housing capacity of 2,370 dwellings. Over 45 Ha of land is earmarked for mixed use development in the capacity study presenred opposite. This mixed use land, particularly that located closest to GCHQ, takes account of the policy requirement of 45 Ha of employment land.
- A4.1.7 This is a high level assessment, based on the assignment of potential housing densities to defined parcels of land across the SPD area. Given that it takes account of potential road and green infrastructure as outlined within the SPD masterplan framework, it is considered to be a more accurate assessment of potential capacity than that undertaken to determine the approximate capacities included in the adopted JCS Policy A7. However, the assessment supplements rather than updates the provisions of this adopted policy and has been undertaken to help promote the development of the site in the context of the policy requirement for a comprehensive masterplan and development strategy for the site, set in the context of the safeguarded land as West Cheltenham (criteria iv(c) under Policy A7).
- A4.1.8 In so doing, the study also extends to and includes the adjacent safeguarded Hayden Sewage Treatment Works (HSTW) site.

WEST CHELTENHAM UK CYBER CENTRAL INDICATIVE DEVELOPMENT SCHEDULE

Neighbourhood	Land use	Parcel #	Area Ha	Density dph	Capacity dwellings
Old Gloucester	Residential	A1	2.09	40	84
	Residential	A2	5.12	35	179
	Education	A3	2.72		
	Residential	A4	4.04	35	141
	Residential	A5	1.62	40	65
	Residential	A6	4.88	40	195
	Residential	A7	1.30	35	46
	Residential	A8	1.23	40	49
Subtotal			20.28		759
Main street neighbourhood	Residential	B1	1.41	35	49
	Residential	B2	3.21	35	112
	Mixed-use	B3	3.21	40	128
	Mixed-use	B4	0.57	40	23
	Mixed-use	B5	0.91	40	36
	Mixed-use	B6	3.78	40	151
	Residential	B7	3.15	35	110
	Mixed-use	B8	2.24	35	78
Subtotal			18.48		689
Cyber Central 1 (local centre)	Mixed-use	C1	2.79	75	69
	Mixed-use	C2	2.08	75	51
	Mixed-use	C3	3.13	75	77
	Mixed-use	C4	2.18	75	54
Subtotal			10.18		252
Cyber Central 2 (employment zone)	Mixed-use	D1	2.14	40	86
	Mixed-use	D2	1.73	40	69
	Mixed-use	D3	1.78	40	71
	Mixed-use	D4	1.36	35	48
	Mixed-use	D5	2.69	35	94
	Mixed-use	D6	1.48	35	52
	Mixed-use	D7	0.46	50	20
Subtotal			11.58		440
Cyber Central 3 (phase 2)	Mixed-use	E1	0.83	50	42
	Mixed-use	E2	1.34	50	67
	Mixed-use	E3	0.84	50	42
	Mixed-use	E4	0.65	40	26
	Mixed-use	E5	1.55	35	54
Subtotal			5.21		231
The Works	Residential	F1	4.27	35	149
	Residential	F2	2.91	50	146
	Residential	F3	0.70	35	25
	Residential	F4	6.07	50	304
	Residential	F5	2.18	35	76
	Residential	F6	3.99	50	200
	Education	F7			0
	Residential	F8	3.40	35	119
	Residential	F9	2.17	35	76
	Residential	F10	4.06	35	142
	Residential	F11	3.00	35	105
Subtotal			32.75		1,341

	no residential component
	35 dph
	40 dph
	50 dph
	75 dph across 33% of area

Residential	Phase		Capacity		Employment	
	#	dwellings	Ha			
ALLOCATED						
Old Gloucester	1	759				
Main street	1	689				
Cyber Central 1	1	252			18.53	
Cyber Central 2	1	440			20.24	
Cyber Central 3	2	231	Target	Difference	12.82	Target Difference
Subtotal		2,370	1,100	1,270	51.59	45.00 6.59

SAFEGUARDED	Phase		Capacity		Employment	
	#	dwellings	Ha			
The Works	2	1,341	Target	Difference	5.58	Target Difference
Subtotal		1,341	1,324	17	5.58	5.00 0.58

Phase	Capacity		Employment	
	#	dwellings	Ha	
Phase 1	1	2,140		38.77
Phase 2	2	1,572	Target	18.40
All phases		3,711	2,424	57.17

Within CBC	Capacity		Employment	
	#	dwellings	Ha	
All phases		1,047		18.15



Notes and assumptions

- Housing densities are applied to each entire parcel.
- Densities are attributed by multiplying the assigned housing density with the area of the host parcel.
- The area taken by indicative routes between parcels are excluded from the area measures.
- Lower housing densities of 35 and 40 dph are likely to be predominantly houses.
- Higher densities of 50 and 75 dph are likely to include a mix of dwelling types including apartments.
- The 'Cyber Central' zones nearest GCHQ are envisaged to be the area with the most diverse mix of uses and the majority of the cyber-tech oriented floorspace.
- In the highest density mixed use area within Cyber Central 1, higher density housing development is only attributed to one third of the total land area in light of the anticipated employment-led nature of new development in this part of the site.
- Mixed uses are also anticipated along the length of the main street traversing the site.
- The three Cyber Central zones notionally account for the required 45 Ha of employment land as set out in Adopted Policy A7.
- However, in view of the guidance outlined in the Golden Valley Masterplan SPD, this land would be developed for a mix of uses so will still contribute to the overall level of housing provision.
- It is assumed that significant areas of green infrastructure will also be delivered with these Cyber Central zones.
- This study finds the allocated site to have an indicative approximate housing development capacity of 2,370.
- This is significantly more than the policy allocation housing capacity of approximately 1,100 dwellings, but is considered to be a more accurate estimate.

Figure 25 High level development capacity study for the allocated and safeguarded land at West Cheltenham (an illustrative framework and not a blueprint for development)

A5 Technical Due Diligence Reports

A5.1.1 The following reports are the collated due diligence reports prepare by Hydrock during the preparation of the SPD. Generally, these reports present desktops reviews of available evidence and an overview of the tachnical baseline studies which were undertaken in support of the allocation of the site for mixed use development through in the JCS. It is important to understand that no new site specific survey work was undertaken during the preparation of the SPD.

A5.1.2 The reports have been important in identifying envieonmental constraints relevent to redevelopment of the allocated site.

A5.1.3 This appendix prepared by Hydrock covers the following issues:

1	Flood risk and drainage	pg 39
2	Geo-technical and geo-environmental	pg 76
3	Air quality	pg 84
4	Odour	pg 88
5	Noise and vibration	pg 91
6	Utilities	pg 113
7	Transport and access	pg 135
8	Ecology	pg 150

FLOOD RISK AND DRAINAGE – 12619-HYD-XX-XX-RP-D-5001-P02

Revision

P03 – Updated on receipt of Masterplan, Constraints Plan and topographic survey

25/03/20

Existing and Proposed Development

The site is approximately 130 ha and predominantly 'greenfield' agricultural land with some scattered farm buildings. It is located on the western fringe of Cheltenham between the B4634 to the north and B4063 to the south.

The proposal is for a residential-led mixed-use development, part of which will accommodate the Cyber Central development.

Reference is made to an un-numbered CAD drawing with the file reference '19123_Masterplan and constraints_190827'. There is no key attached to the drawing and therefore various elements of details shown on the drawing have been inferred.

It is noted that proposed development is shown to the adjacent Severn Trent Water sewage treatment works (STW) to the west of the site however, these are outside of the 'red line' and therefore have been ignored for the purposes of this Technical Note.

Geology / Groundwater

The British Geological Survey (BGS) Geology of Britain Viewer indicates the site is underlain by the mudstone bedrock 'Charmouth Mudstone Formation' which is of a low permeability with little groundwater storage capacity.

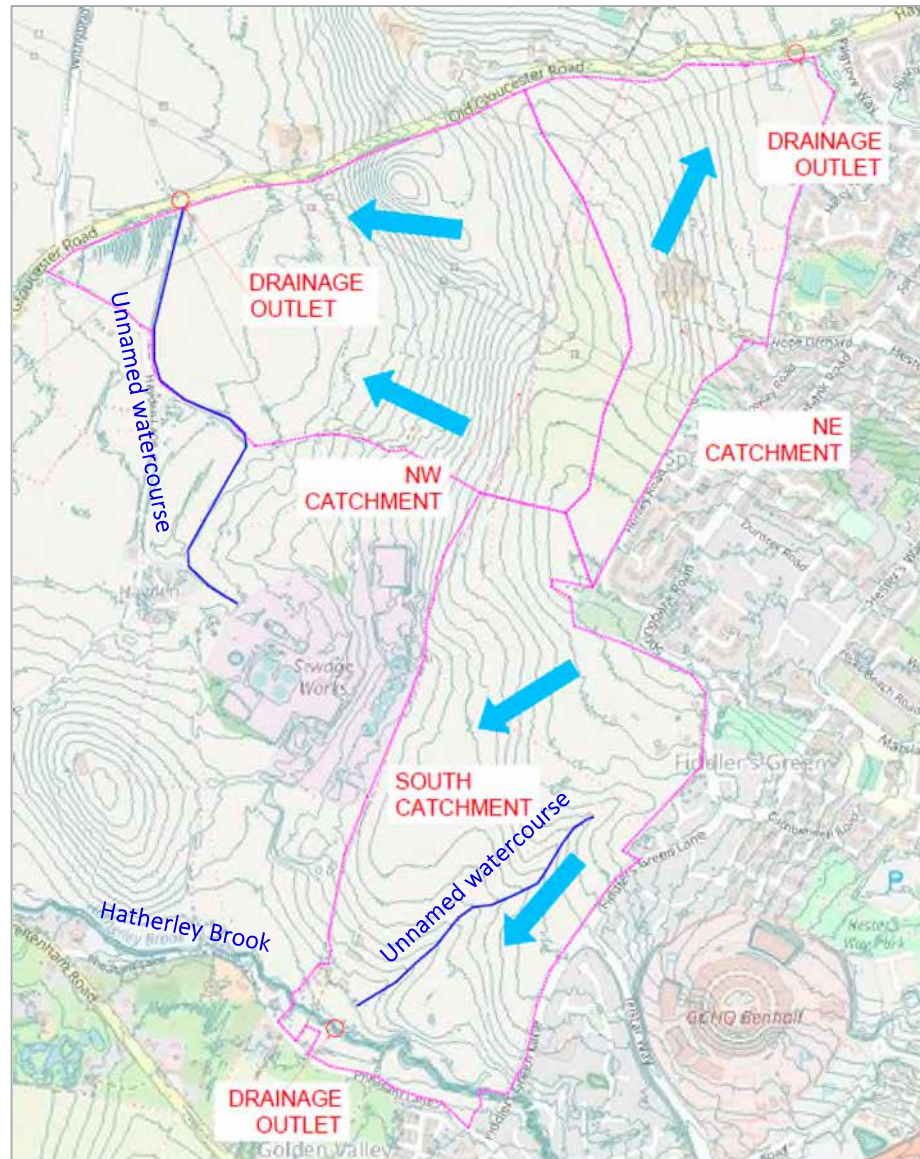
Hydrology and Drainage Catchments

Hatherley Brook runs westwards through the southern section of the site and the River Chelt runs westwards to the north of the site (approximately 500m from the northern site boundary). There are also minor drainage ditches which originate within, or just outside, the site boundary. Hatherley Brook and the River Chelt are classified as 'main rivers' which are significant watercourses under the jurisdiction of the Environment Agency (EA).

Figure 1 shows the site falls into three drainage catchments; the approximate catchment boundaries were identified from LiDAR and are defined in pink. The direction of overland flow is shown by the blue arrows. The high ground is located in the centre of the site, with the north of the site draining to the north-east and north-west towards the River Chelt and the south draining towards the Hatherley Brook. The drawing also indicates the outlets where the existing drainage ditches / minor watercourses currently drain from the site.

The main watercourses to be respected in the development layout are identified by blue lines. These are watercourses which either originate offsite or have a defined catchment from review of LiDAR.

Figure 1 – Watercourses and Drainage Flow Paths



Flood Risk – Opportunities and Constraints

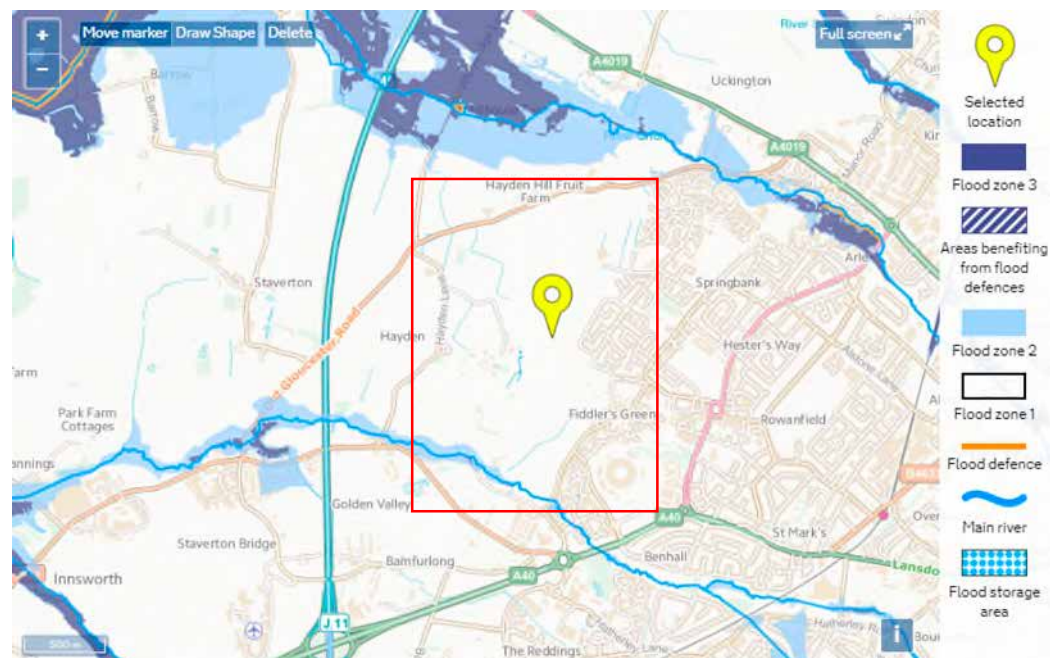
The EA's Flood Map for Planning shows that almost the entire redline site is within Flood Zone 1 which is the zone of lowest risk (in relation to fluvial / tidal / coastal risk), considered suitable for all types of development. There is a narrow floodplain associated with the Hatherley Brook in the southern section of the site allocated as fluvial Flood Zone 2 which is land assessed as having a between a 1 in 100 and 1 in 1000 chance of flooding annually. This should remain undeveloped, which is respected in the current masterplan. It should be noted that the EA's flood outlines do not include any allowance for climate change and this is likely to be required as the scheme progresses in line with policy requirements.

Figure 1 shows there are two minor unnamed watercourses on site which have an associated fluvial floodplain which have not been modelled by the EA (the EA generally only model watercourses with a contributing area in excess of 3km²). However, in the absence of detailed fluvial modelling, the surface water mapping shown in Figure 3 can

be used as an indication of the floodplain extent at this stage. Hydraulic modelling could be undertaken to determine the exact floodplain or an easement from the top of the bank could be agreed with the Lead Local Flood Authority (LLFA). This is likely to be in the order of 5-8m and would create a 'blue corridor' through the site whilst also maintaining suitable access for watercourse management and maintenance. Should the watercourses require diversion / culverting as part of the layout requirements, hydraulic modelling will be required to demonstrate no adverse effect to the development or elsewhere. Any requirement for modelling would be confirmed with the EA and/or LLFA as the scheme progresses.

The field drainage ditches, which do not follow natural contours, do not need to be considered in the masterplan constraints as they would be infilled post-development.

Figure 2 – Flood Map for Planning



The surface water flood map (Figure 3) identifies areas of low lying ground and dry valleys which would be more susceptible to flooding. This shows the north-western corner of the site, where the ground flattens out, is considered to be at 'high risk' of surface water flooding during the 1 in 30 year storm event or greater. However, it is noted that this is only an indicative risk and as surface water flows would be generated from within the site boundary, this can be mitigated by formal management of flows in the surface water drainage system. This means built development and attenuation features can be considered within this area, as long as they meet policy requirements (i.e. no detrimental impact to third party land). However, from a surface water drainage and ecological perspective, it is recommended that at least part of this area is allocated as public open space / wetland which can serve as a green surface water attenuation feature serving the wider development, as well as maintaining the naturally wet habitat for ecology. This would also aid in improving water quality and therefore could be

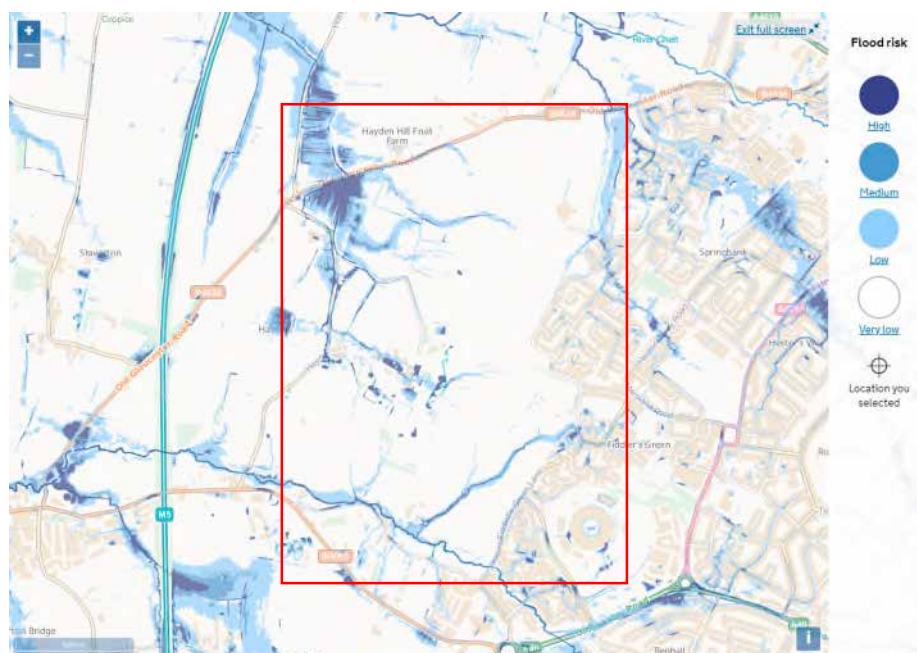
included within any Water Framework Directive Assessment being progressed from the site (undertaken by others).

The current Masterplan appears to respect this 'high risk'.

The dry valley in the north-eastern catchment is only at risk of surface water flooding in the 1 in 1000 year storm. This area is still suitable for development, but a continuous pathway needs to be provided for surface water around buildings (e.g. by local ground re-profiling). This also applies to the south-eastern part of the site, where there is an overland flow route into the unnamed watercourse in the 1 in 1000 year event.

The flow paths shown in the north-western catchment in Figure 3 are not picked up in the LiDAR or the topographic survey, which indicates there are no significant valleys where surface water would be expected to collect and therefore this is not considered a constraint to development.

Figure 3 – Surface Water Flood Risk Map



The risk of groundwater flooding at the site is considered to be low based on the low permeability mudstone bedrock indicated on the British Geological Survey website, and based on the site topography.

There are strategic sewers within the site boundary which could pose a risk of flooding if a blockage occurred. However, provided the development is suitably designed to direct exceeded flows away from vulnerable infrastructure, as is best-practice, this risk is concluded to be low. The risk from other artificial infrastructure failure, such as canals and reservoirs is concluded to be negligible from a review of upstream infrastructure and the EA's reservoir flood maps.

Foul Drainage – Opportunities and Constraints

Copies of Severn Trent Water sewer record plans have been obtained (see Appendix A). The records provided were incomplete and a further request has been made to cover the whole site.

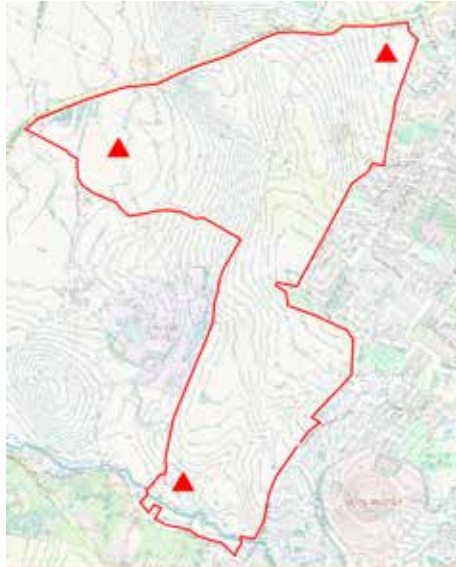
There are two strategic sewers crossing the southern section of the site, entering by the junction of Fiddler's Green Lane and Telstar Way. One is a 600mm diameter gravity foul sewer and the other is a 1050mm diameter combined sewer, as shown on the drawings attached in Appendix A. These sewers will have an associated easement where no buildings will be permitted. Severn Trent Water have confirmed that these easement widths will be 5.0m and 7.5 m respectively measured either side of the pipe centreline. It is noted that the topographic survey only records two manholes along the sewer route where at least six would be expected. It is not known therefore which sewer the manholes shown refer to and hence where the easement widths should be measured from therefore some doubt as to the exact extent of any 'no-build' zone exists. Notwithstanding this, the current Masterplan still appears to have provided sufficient space such that there is no conflict.

The Severn Trent Water plans also indicate two combined sewers entering the upper eastern site boundary from Hope Orchard and crossing the central part of the site in a north-east to south-west direction heading towards the sewage treatment works. The sewers are recorded as being 750mm and 1500mm diameter. Severn Trent Water have confirmed that each sewer will have an easement width associated with it of 7.5m measured from the centreline each side of the pipe. As for the previous description, the topographic survey does not appear to record all of the manholes shown on the sewer record plans and therefore there is some doubt as to the exact alignment. Of more concern is the fact that the survey indicates an additional set of manholes near the boundary with the treatment works indicating that the western part of the sewer route takes a different alignment to that shown on the record plans. This is shown on drawing no. 12619-HYD-XX-XX-DR-D-2001 attached in Appendix A. Notwithstanding this, the current Masterplan appears to avoid built development in either of the possible sewer routes and therefore, at present, there should be no conflict.

There are no foul sewers evident on Old Gloucester Road to the north nor Pheasant Lane to the south. Therefore, given the fall of the site to the north and south, it is expected that the site will need to be served by a pumping station in each drainage catchment (i.e. 3 pumping stations), in order to pump flows to the existing sewers running through the site. The approximate locations of the pumping stations are shown as red triangles in Figure 4 below. There are existing Severn Trent Water pumping stations very close to the site boundary on the north-west and north-east corners and an option may be to connect to these stations and upgrade accordingly. This would however require significant works to the stations and it may be easier and more economic to build new stations solely for the proposed development.

Discussions will also need to be undertaken with Severn Trent Water to confirm whether there is capacity in the sewers and sewage treatment works to serve a development of this size, or whether upgrade works will be required. The cost of upgrades is expected to be covered under the new infrastructure charge which is a standard per-plot connection charge.

Figure 4 – Proposed Foul pumping Stations



Surface Water Drainage – Opportunities and Constraints

In accordance with Building Regulations Part H and Paragraph 080 of NPPG, rainfall runoff should be infiltrated to ground, discharged to local watercourses or discharged to a local sewer network (in that order of priority). The preferred method of managing runoff by infiltration is not likely to be feasible based on the mudstone bedrock but this is subject to confirmation through site specific tests. If infiltration is not feasible, the drainage strategy would involve a positive discharge into the watercourses on site.

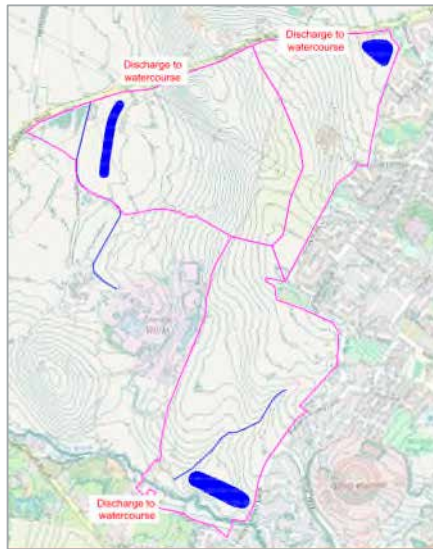
The LLFA will require the restriction of post-development flows to the undeveloped, 'greenfield' rates and storage for the runoff will need to be provided for the 1 in 100 year plus 40% climate change storm event. There is a strong desire by the LLFA to see the provision of above ground green storage features which provide both attenuation and water quality benefits (e.g. swales, ponds, basins, permeable paving etc.). It will be important to allow for the inclusion of such features within the development layout proposals.

Table 1 below shows the estimated impermeable areas within each drainage catchment based on the previous draft layout of the scheme issued by Turley (reference number: BELU3001_10_20). The greenfield QBAR runoff rate for this site was calculated in MicroDrainage as 3.4 l/s/ha (see Appendix A) and equivalent runoff rates and storage requirements were calculated for the estimated impermeable areas as shown in Table 1. The estimated plan areas of attenuation basins were then calculated based on an assumed maximum basin depth of 1.5m and side slopes of 1:4. These have been plotted on Figure 5 to give a rough estimate of the land take of storage features for each catchment but the size and location of these is indicative only and subject to change as the scheme progresses. In reality, it is expected that the storage will be divided between a number of ponds or other green storage features throughout the catchment, but allowance should be made for the main storage feature at the lower levels of the site to allow the development to drain by gravity.

Table 1 – Runoff Rates and Storage Requirements

Drainage Catchment	Total Area	Estimated Impermeable Area	Runoff Rate @ Greenfield QBAR	Storage Requirement	Estimated plan area of basin
North-west	52 ha	15.9 ha	54.1 l/s	11,270 m ³	14,143 m ²
North-east	28 ha	9.4 ha	31.8 l/s	6,666 m ³	10,045 m ²
South	51 ha	11.6 ha	40.7 l/s	8,508 m ³	17,880 m ²

Figure 5 – Indicative Attenuation Ponds



Summary

Based on this preliminary assessment, it is considered that a large proportion of the site can be safely developed as it is at a low risk of flooding and does not increase flood risk elsewhere. Residential units and their main access and egress routes should be located outside of the floodplain and a corridor free from structures will need to be provided along all valleys within the site.

There are sewers running through the site which will have an associated easement where no buildings / structures are permitted. It is recommended that further survey work is carried out to accurately determine the locations of the sewers as there appears to be incomplete and inconsistent information when comparing the sewer record plans and the topographic survey. The site will require a number of foul pumping stations to reach the existing foul sewers.

The preferred method of managing runoff via infiltration is not considered to be feasible at this site due to the mudstone geology. Therefore, the site should discharge to the local watercourses at the pre-development 'greenfield' rate, with storage provided within green storage features. Space is to be allocated for such features within the layout, downslope of the proposed development.

Appendix A

Sewer Records

Greenfield Runoff Calculations

Preliminary Surface Water Attenuation Calculations

Existing Public Sewers on Topographic Survey



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CATEGORIE

3YAS4B	3CASAADA	3I AN- (A,B)	389E B677B.	3P AD A*,A	3 ACKIB (P	3SPPH O	3HGHPA DSA+O	3SHCTGP T,c
APE	3CRCLAB	3EGG SHAPE!	X TH&S	3M CTAN G*	3SW UANA	3TAPRHS 4 AL	3UG O, W0	

TABLE 1		PURPOSE
A.	Sewer piping	C 30' / - 40'
B.	Where the downstreet	D 3'-0" EFF
C.	Gradient	F 3'00"
		S 35' U/ GE
		35 U/ FACE

...am server p1p.

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SEWELL
WATER

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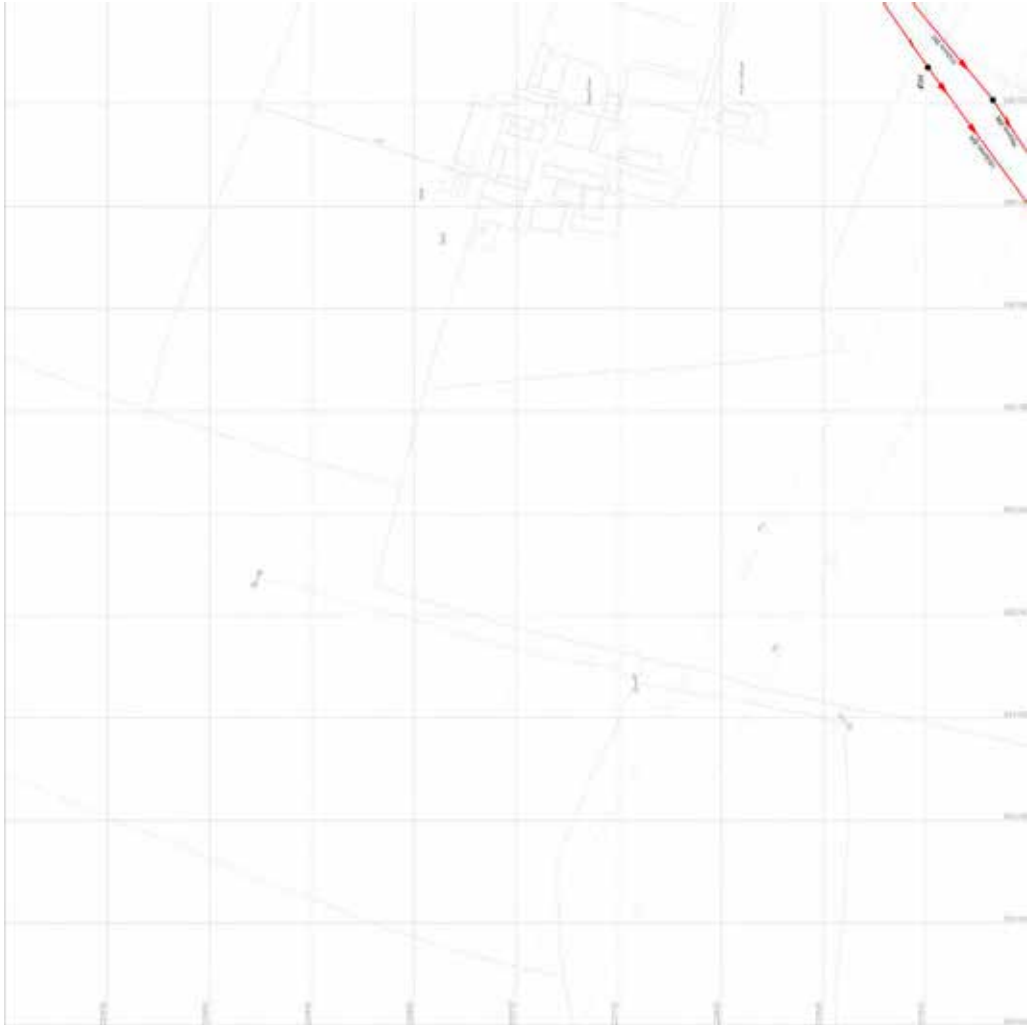
SO912ASW

SO9123NE

SO9223NE

SO9123SW

Sewer Node									
REFERENCE	COVER LIDS	PIPE DIA	INVERT	MANP	MANL	INLET	OUTLET	WATER	W.D
SO9123NE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SO9123SW	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0



TABULAR KEY
A. Sewer pipe data refers to downstream sewer pipe.
B. Where the node identifier (prefix) X and Y indicates.
C. Gradient is added in 1 in.

CATEGORIES

MATERIALS

Abandoned Sewer	Cable & Starting	Find & Set	Sewer Chemical Injection Point	Sewer Junction	Combined Use / anhole	Private Combined Gravity Sewer
Private Foul Gravity Sewer	Cable, Optical Fibre Instrumentation	Combined Use / anhole	Sewer Junction	Sewer Junction	Flushing Chamber	Private Foul Gravity Sewer
Private Surface Water Gravity Sewer	Cable, Low, offstage	Foul Use / anhole	Sewerage Hatch - on Point	Sewerage Hatch - on Point	Grease Trap	Private Surface Water Gravity Sewer
Public Combined Gravity Sewer	Cable, High, offstage	Sewerage Isolation, alive	Sewerage Isolation, alive	Sewerage Isolation, alive	Head Code	Public Combined Gravity Sewer
Public Foul Gravity Sewer	Cable, (ther)	Soakaway	Soakaway	Soakaway	Hydrodrake	Public Foul Gravity Sewer
Trunk Combined Gravity Sewer	Housing, - ulding	Surface Water / anhole	Surface Water / anhole	Surface Water / anhole	Lampole	Trunk Combined Gravity Sewer
Trunk Foul Use Gravity Sewer	Housing, - isk	ent Column	ent Column	ent Column	Overflow	Trunk Foul Use Gravity Sewer
Trunk Surface Water Gravity Sewer	Is) Local Site	Waste Water Storage	Waste Water Storage	Waste Water Storage	Penstock	Trunk Surface Water Gravity Sewer
Combined Use Pressurised Sewer	Sewage Treatment Works	Curbed Watercourse	Curbed Watercourse	Curbed Watercourse	Sewer Blockage	Combined Use Pressurised Sewer
Foul Use Pressurised Sewer	Housing, (ther	Pre-1937 Properties	Pre-1937 Properties	Pre-1937 Properties	Sewer Collapse	Foul Use Pressurised Sewer
Surface Water Pressurised Sewer	Pipe Support Structure					Surface Water Pressurised Sewer
High Way Drain	Sewage Pumping Facility					High Way Drain
Combined Lateral / rain 6SS	Sewer Facility Connection rest / ullet					Combined Lateral / rain 6SS
Foul Lateral / rain 6SS						Foul Lateral / rain 6SS
Surface Water Lateral / rain 6SS						Surface Water Lateral / rain 6SS

PURPOSE

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Sewer Node	Sewer Pipe Data
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PO Box 5344
Wolverhampton
CV9 9YT
Telephone: 0845 651 6816

SEWER RECORD (TABULAR)

Map scale: 1:1250


Sheet No. 1 of 1

This map is centred upon:
O 15 The reference:
S0900235W

Declaration Statement

I, the undersigned, declare that this map was prepared by me or under my direct supervision and that I am a duly qualified and experienced person for the purpose of preparing such maps. I declare that this map is a true and correct copy of the original map and that it is a true and correct copy of the original map and that it is a true and correct copy of the original map.

Signature: _____ **Date:** _____



Severn Trent Water Limited
Asset Data Management
PO Box 5344
Wolverhampton
CV9 9YT
Telephone: 0845 651 6816

SEWER RECORD (TABULAR)

Map scale: 1:1250

Sheet No. 1 of 1

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Signature: _____ **Date:** _____

55



Week Number	Survey Period Dates				Week Number			
	Start Date	End Date	Start Date	End Date	Start Date	End Date	Start Date	End Date
1	01/01/2020	01/05/2020	01/06/2020	01/11/2020	2	01/12/2020	01/17/2020	01/22/2020
2	01/12/2020	01/18/2020	01/19/2020	01/25/2020	3	01/26/2020	02/01/2020	02/08/2020
3	01/26/2020	02/01/2020	02/02/2020	02/08/2020	4	02/09/2020	02/15/2020	02/22/2020
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8	04/05/2020	04/11/2020	04/12/2020	04/18/2020	9	04/19/2020	04/25/2020	05/02/2020
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84	03/05/2023	03/11/2023	03/12/2023	03/18/2023	85	03/19/2023	03/25/2023	04/01/2023
85	03/19/2023	03/25/2023	03/26/2023	04/01/2023	86	03/26/2023	04/01/2023	04/08/2023
86	03/26/2023	04/01/2023	04/02/2023	04/08/2023	87	04/09/2023	04/15/2023	04/22/2023
87	04/09/2023	04/15/2023	04/16/2023	04/22/2023	88	04/23/2023	04/29/2023	05/06/2023
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97	08/27/2023	09/02/2023	09/03/2023	09/09/2023	98	09/10/2023	09/16/2023	09/23/2023
98	09/10/2023	09/16/2023	09/17/2023	09/23/2023	99	09/24/2023	09/30/2023	10/07/2023
99	09/24/2023	09/30/2023	10/01/2023	10/07/2023	100	10/08/2023	10/14/2023	10/21/2023
100	10/08/2023	10/14/2023	10/15/2023	10/21/2023	101	10/22/2023	10/28/2023	11/04/2023



TABULAR KEY

A. Sewer pipe data refers to downstream sewer pipe.

B. When the node bifurcates (splits) X and Y indicates downstream sewer pipe.





C. Gradient is stated as 1 in...

CATEGORIES

MATERIALS

Symbol	Function	Location
	Wind Sift	Sewer Chemical Ejection Point
	Combined Use / Anode	Sewer Junction
	Flushing Chamber	Sewerage Air Valve

Cable, & Earthing

 Abandoned Sewer
 Private Combined Gravity Sewer
 Private Foul Gravity Sewer
 Private Surface Water Gravity Sewer

SEWER RECORD (TABULAR)

This map is centred upon:
O / S Title reference:

O/S Map scale:	1:1250	
Date of Issue:	02.08.19	
Sheet No.	1 of 1	S0123SW

[illegible]

All Private Sewers are shown in magenta
All private 104 sewers are shown in green
All sewers that have been transferred to Severn Trent Water after the 4th October 2014 but have not been surveyed and confirmed by Severn Trent Water are shown in orange

MSO9023SW

MS20090225W

57

[illegible]

CATEGORIES

[illegible]

TABULAR KEY

- TABULAR KEY**

PURPOSE

- PURPOSE**

Govern Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9PT
Telephone: 0845 601 6616

SEWER RECORD (TABULAR)

This map is centred upon:
O / S Title reference:
SO0122NW

[illegible]

S08922SE

SO9021NW

Symbol	Description	Notes
	Abandoned Sewer	
	Private Combined Gravitational Sewer	
	Private Foul Gravity Sewer	
	Private Surface Water Gravity Sewer	
	Public Combined Gravitational Sewer	
	Public Foul Gravity Sewer	
	Public Surface Water Gravity Sewer	
	Trunk Combined Gravitational Sewer	
	Trunk Foul Gravity Sewer	
	Trunk Surface Water Gravity Sewer	
	Combined Use Pressurised Sewer	
	Foul Use Pressurised Sewer	
	Surface Water Pressurised Sewer	
	Highway Drain	
	Connected Lateral / manhole	
	Foul Lateral / manhole	
	Surface Water Lateral / manhole	
	Sewer Chemical Injection Point	
	Sewer Junction	
	Sewage Air Valve	
	Sewage Hatch - access point	
	Sewage solution valve	
	Soleway	
	Surface Water / Inlet	
	Vent Column	
	Waste Water Storage	
	Coloured Watercourse	
	Pre-1937 Properties	

TABULAR KEY


SEWER RECORD (TABULAR)


[illegible]

[illegible]

SO9122SW

[illegible]


Hydrock Consultants Ltd		Page 1
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Date 08/08/2019 09:32	Designed by GemmaGoodmore	
File	Checked by	
Innovyze	Source Control 2018.1	
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Hydrock Consultants Ltd		Page 1
.	NE Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NE Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.749	0.249	31.8	2006.4	O K
30 min Summer	0.832	0.332	31.8	2693.1	O K
60 min Summer	0.920	0.420	31.8	3433.8	O K
120 min Summer	1.011	0.511	31.8	4204.1	O K
180 min Summer	1.062	0.562	31.8	4640.8	O K
240 min Summer	1.094	0.594	31.8	4922.4	O K
360 min Summer	1.133	0.633	31.8	5259.3	O K
480 min Summer	1.158	0.658	31.8	5472.4	O K
600 min Summer	1.173	0.673	31.8	5604.9	O K
720 min Summer	1.182	0.682	31.8	5684.0	O K
960 min Summer	1.188	0.688	31.8	5738.1	O K
1440 min Summer	1.173	0.673	31.8	5608.1	O K
2160 min Summer	1.139	0.639	31.8	5311.0	O K
2880 min Summer	1.112	0.612	31.8	5076.5	O K
4320 min Summer	1.064	0.564	31.8	4655.8	O K
5760 min Summer	1.013	0.513	31.8	4217.5	O K
7200 min Summer	0.960	0.460	31.8	3767.4	O K
8640 min Summer	0.909	0.409	31.8	3335.0	O K
10080 min Summer	0.861	0.361	31.8	2938.0	O K
15 min Winter	0.779	0.279	31.8	2254.2	O K
30 min Winter	0.872	0.372	31.8	3027.5	O K
60 min Winter	0.971	0.471	31.8	3866.2	O K
120 min Winter	1.074	0.574	31.8	4744.6	O K
180 min Winter	1.132	0.632	31.8	5245.5	O K
240 min Winter	1.169	0.669	31.8	5575.2	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	117.448	0.0	2056.5	27
30 min Summer	79.010	0.0	2681.8	42
60 min Summer	50.812	0.0	3563.2	72
120 min Summer	31.621	0.0	4434.6	130
180 min Summer	23.637	0.0	4973.1	190
240 min Summer	19.105	0.0	5099.4	250
360 min Summer	14.037	0.0	5036.1	368
480 min Summer	11.286	0.0	4999.1	488
600 min Summer	9.522	0.0	4976.4	606
720 min Summer	8.282	0.0	4962.2	726
960 min Summer	6.640	0.0	4948.2	964
1440 min Summer	4.854	0.0	4949.9	1440
2160 min Summer	3.541	0.0	8942.7	1844
2880 min Summer	2.828	0.0	9523.2	2224
4320 min Summer	2.055	0.0	9056.3	3028
5760 min Summer	1.637	0.0	11020.6	3856
7200 min Summer	1.371	0.0	11540.1	4616
8640 min Summer	1.186	0.0	11975.1	5368
10080 min Summer	1.049	0.0	12368.4	6152
15 min Winter	117.448	0.0	2304.1	28
30 min Winter	79.010	0.0	2659.7	42
60 min Winter	50.812	0.0	3989.7	70
120 min Winter	31.621	0.0	4969.1	128
180 min Winter	23.637	0.0	5057.1	188
240 min Winter	19.105	0.0	5008.5	246

Hydrock Consultants Ltd		Page 2
.	NE Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NE Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
360 min Winter	1.215	0.715	31.8	5980.9	Flood Risk
480 min Winter	1.246	0.746	31.8	6248.4	Flood Risk
600 min Winter	1.266	0.766	31.8	6425.9	Flood Risk
720 min Winter	1.279	0.779	31.8	6544.1	Flood Risk
960 min Winter	1.293	0.793	31.8	6666.4	Flood Risk
1440 min Winter	1.291	0.791	31.8	6653.6	Flood Risk
2160 min Winter	1.256	0.756	31.8	6338.4	Flood Risk
2880 min Winter	1.216	0.716	31.8	5988.0	Flood Risk
4320 min Winter	1.152	0.652	31.8	5424.6	O K
5760 min Winter	1.081	0.581	31.8	4810.1	O K
7200 min Winter	1.002	0.502	31.8	4129.8	O K
8640 min Winter	0.920	0.420	31.8	3430.9	O K
10080 min Winter	0.845	0.345	31.8	2803.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
360 min Winter	14.037	0.0	4958.3	362
480 min Winter	11.286	0.0	4933.1	480
600 min Winter	9.522	0.0	4920.5	596
720 min Winter	8.282	0.0	4915.8	712
960 min Winter	6.640	0.0	4919.4	942
1440 min Winter	4.854	0.0	4955.4	1394
2160 min Winter	3.541	0.0	10018.9	2036
2880 min Winter	2.828	0.0	9884.7	2340
4320 min Winter	2.055	0.0	9262.8	3248
5760 min Winter	1.637	0.0	12343.6	4160
7200 min Winter	1.371	0.0	12931.1	5048
8640 min Winter	1.186	0.0	13424.3	5808
10080 min Winter	1.049	0.0	13855.0	6568

Hydrock Consultants Ltd		Page 3
.	NE Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NE Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 9.359

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)
0 4 3.000	4 8 3.000	8 12 3.000	12 16 0.359				

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	From: To: (ha)
0 4 0.000	

Hydrock Consultants Ltd		Page 4
.	NE Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NE Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	7900.0	1.000	9210.6


Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0236-3180-1500-3180
Design Head (m)	1.500
Design Flow (l/s)	31.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	236
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	31.8	Kick-Flo®	1.021	26.5
Flush-Flo™	0.466	31.8	Mean Flow over Head Range	-	27.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.8	0.800	30.3	2.000	36.5	4.000	51.0	7.000	66.9
0.200	23.9	1.000	27.1	2.200	38.2	4.500	54.0	7.500	69.2
0.300	30.8	1.200	28.6	2.400	39.8	5.000	56.8	8.000	71.4
0.400	31.7	1.400	30.8	2.600	41.4	5.500	59.5	8.500	73.5
0.500	31.8	1.600	32.8	3.000	44.4	6.000	62.1	9.000	75.6
0.600	31.5	1.800	34.7	3.500	47.8	6.500	64.5	9.500	77.6

Hydrock Consultants Ltd		Page 1
.	NW Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NW Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.831	0.331	54.1	3386.5	O K
30 min Summer	0.941	0.441	54.1	4554.5	O K
60 min Summer	1.059	0.559	54.1	5817.3	O K
120 min Summer	1.180	0.680	54.1	7129.2	O K
180 min Summer	1.246	0.746	54.1	7866.0	O K
240 min Summer	1.289	0.789	54.1	8342.0	O K
360 min Summer	1.340	0.840	54.1	8908.1	O K
480 min Summer	1.371	0.871	54.1	9264.4	O K
600 min Summer	1.391	0.891	54.1	9483.1	O K
720 min Summer	1.402	0.902	54.1	9611.7	O K
960 min Summer	1.409	0.909	54.1	9691.6	O K
1440 min Summer	1.388	0.888	54.1	9448.9	O K
2160 min Summer	1.344	0.844	54.1	8953.3	O K
2880 min Summer	1.309	0.809	54.1	8564.4	O K
4320 min Summer	1.247	0.747	54.1	7868.9	O K
5760 min Summer	1.184	0.684	54.1	7171.9	O K
7200 min Summer	1.116	0.616	54.1	6434.0	O K
8640 min Summer	1.046	0.546	54.1	5674.0	O K
10080 min Summer	0.982	0.482	54.1	4985.3	O K
15 min Winter	0.871	0.371	54.1	3808.2	O K
30 min Winter	0.995	0.495	54.1	5123.1	O K
60 min Winter	1.127	0.627	54.1	6554.0	O K
120 min Winter	1.263	0.763	54.1	8044.8	O K
180 min Winter	1.339	0.839	54.1	8894.2	O K
240 min Winter	1.388	0.888	54.1	9452.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	117.448	0.0	3500.4	36
30 min Summer	79.010	0.0	4578.1	50
60 min Summer	50.812	0.0	6062.8	80
120 min Summer	31.621	0.0	7546.7	138
180 min Summer	23.637	0.0	8460.4	198
240 min Summer	19.105	0.0	8730.5	256
360 min Summer	14.037	0.0	8656.8	374
480 min Summer	11.286	0.0	8616.6	492
600 min Summer	9.522	0.0	8594.4	610
720 min Summer	8.282	0.0	8582.1	730
960 min Summer	6.640	0.0	8573.8	966
1440 min Summer	4.854	0.0	8588.0	1440
2160 min Summer	3.541	0.0	15219.3	1808
2880 min Summer	2.828	0.0	16205.8	2176
4320 min Summer	2.055	0.0	15542.0	2988
5760 min Summer	1.637	0.0	18759.1	3816
7200 min Summer	1.371	0.0	19636.0	4624
8640 min Summer	1.186	0.0	20377.1	5376
10080 min Summer	1.049	0.0	21041.8	6160
15 min Winter	117.448	0.0	3922.6	37
30 min Winter	79.010	0.0	4537.2	50
60 min Winter	50.812	0.0	6787.6	78
120 min Winter	31.621	0.0	8454.0	136
180 min Winter	23.637	0.0	8683.6	194
240 min Winter	19.105	0.0	8631.0	252

Hydrock Consultants Ltd		Page 2
.	NW Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NW Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
360 min Winter	1.449	0.949	54.1	10137.5	O K
480 min Winter	1.488	0.988	54.1	10587.3	O K
600 min Winter	1.514	1.014	54.1	10883.1	O K
720 min Winter	1.531	1.031	54.1	11077.4	O K
960 min Winter	1.547	1.047	54.1	11270.3	O K
1440 min Winter	1.543	1.043	54.1	11219.6	O K
2160 min Winter	1.494	0.994	54.1	10652.9	O K
2880 min Winter	1.444	0.944	54.1	10084.9	O K
4320 min Winter	1.360	0.860	54.1	9131.1	O K
5760 min Winter	1.268	0.768	54.1	8108.8	O K
7200 min Winter	1.172	0.672	54.1	7041.3	O K
8640 min Winter	1.061	0.561	54.1	5840.9	O K
10080 min Winter	0.959	0.459	54.1	4744.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
360 min Winter	14.037	0.0	8584.1	368
480 min Winter	11.286	0.0	8568.8	484
600 min Winter	9.522	0.0	8568.5	600
720 min Winter	8.282	0.0	8576.8	716
960 min Winter	6.640	0.0	8608.6	944
1440 min Winter	4.854	0.0	8705.4	1394
2160 min Winter	3.541	0.0	17046.7	2024
2880 min Winter	2.828	0.0	17121.1	2296
4320 min Winter	2.055	0.0	16015.8	3216
5760 min Winter	1.637	0.0	21016.2	4152
7200 min Winter	1.371	0.0	21988.3	5048
8640 min Winter	1.186	0.0	22831.2	5880
10080 min Winter	1.049	0.0	23570.8	6576

Hydrock Consultants Ltd		Page 3
.	NW Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NW Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 15.920

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 3.000		8 12 3.000		16 20 3.000	
4 8 3.000		12 16 3.000		20 24 0.920	

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

Hydrock Consultants Ltd		Page 4
.	NW Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File NW Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 2.000

Tank or Pond Structure

Invert Level (m) 0.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	10000.0	1.000	11468.2	1.500	12000.0


Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0297-5410-1600-5410
Design Head (m)	1.600
Design Flow (l/s)	54.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	297
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	54.1	Kick-Flo®	1.131	45.8
Flush-Flo™	0.530	54.1	Mean Flow over Head Range	-	45.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	0.800	52.7	2.000	60.2	4.000	84.3	7.000	110.7
0.200	30.6	1.000	50.0	2.200	63.1	4.500	89.3	7.500	114.5
0.300	51.2	1.200	47.1	2.400	65.8	5.000	93.9	8.000	118.1
0.400	53.3	1.400	50.7	2.600	68.4	5.500	98.4	8.500	121.7
0.500	54.0	1.600	54.1	3.000	73.3	6.000	102.7	9.000	125.1
0.600	53.9	1.800	57.2	3.500	79.0	6.500	106.8	9.500	128.5

Hydrock Consultants Ltd		Page 1
.	South Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File South Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.664	0.164	40.7	2559.5	O K
30 min Summer	0.719	0.219	40.7	3434.6	O K
60 min Summer	0.778	0.278	40.7	4378.1	O K
120 min Summer	0.839	0.339	40.7	5353.4	O K
180 min Summer	0.873	0.373	40.7	5900.9	O K
240 min Summer	0.895	0.395	40.7	6256.1	O K
360 min Summer	0.921	0.421	40.7	6677.8	O K
480 min Summer	0.937	0.437	40.7	6944.5	O K
600 min Summer	0.947	0.447	40.7	7109.3	O K
720 min Summer	0.953	0.453	40.7	7205.8	O K
960 min Summer	0.957	0.457	40.7	7264.8	O K
1440 min Summer	0.945	0.445	40.7	7065.7	O K
2160 min Summer	0.919	0.419	40.7	6653.7	O K
2880 min Summer	0.899	0.399	40.7	6333.4	O K
4320 min Summer	0.864	0.364	40.7	5765.7	O K
5760 min Summer	0.830	0.330	40.7	5209.9	O K
7200 min Summer	0.796	0.296	40.7	4671.1	O K
8640 min Summer	0.763	0.263	40.7	4145.6	O K
10080 min Summer	0.733	0.233	40.7	3656.1	O K
15 min Winter	0.684	0.184	40.7	2876.4	O K
30 min Winter	0.746	0.246	40.7	3861.9	O K
60 min Winter	0.812	0.312	40.7	4929.7	O K
120 min Winter	0.882	0.382	40.7	6043.5	O K
180 min Winter	0.921	0.421	40.7	6679.6	O K
240 min Winter	0.947	0.447	40.7	7098.9	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	117.448	0.0	2625.8	30
30 min Summer	79.010	0.0	3482.3	45
60 min Summer	50.812	0.0	4547.1	74
120 min Summer	31.621	0.0	5663.4	134
180 min Summer	23.637	0.0	6350.3	192
240 min Summer	19.105	0.0	6848.7	252
360 min Summer	14.037	0.0	6814.5	370
480 min Summer	11.286	0.0	6780.0	490
600 min Summer	9.522	0.0	6753.9	608
720 min Summer	8.282	0.0	6734.5	728
960 min Summer	6.640	0.0	6710.8	964
1440 min Summer	4.854	0.0	6703.4	1440
2160 min Summer	3.541	0.0	11424.0	1796
2880 min Summer	2.828	0.0	12163.1	2160
4320 min Summer	2.055	0.0	12268.3	2944
5760 min Summer	1.637	0.0	14095.0	3752
7200 min Summer	1.371	0.0	14755.9	4544
8640 min Summer	1.186	0.0	15298.6	5360
10080 min Summer	1.049	0.0	15797.7	6144
15 min Winter	117.448	0.0	2942.7	30
30 min Winter	79.010	0.0	3469.9	45
60 min Winter	50.812	0.0	5094.7	74
120 min Winter	31.621	0.0	6346.6	132
180 min Winter	23.637	0.0	6824.2	190
240 min Winter	19.105	0.0	6779.0	248

Hydrock Consultants Ltd		Page 2
.	South Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File South Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
360 min Winter	0.978	0.478	40.7	7616.0	O K
480 min Winter	0.999	0.499	40.7	7960.1	O K
600 min Winter	1.013	0.513	40.7	8190.4	O K
720 min Winter	1.023	0.523	40.7	8345.3	O K
960 min Winter	1.033	0.533	40.7	8508.4	O K
1440 min Winter	1.032	0.532	40.7	8494.3	O K
2160 min Winter	1.005	0.505	40.7	8053.4	O K
2880 min Winter	0.974	0.474	40.7	7541.2	O K
4320 min Winter	0.924	0.424	40.7	6728.8	O K
5760 min Winter	0.871	0.371	40.7	5874.5	O K
7200 min Winter	0.819	0.319	40.7	5027.3	O K
8640 min Winter	0.768	0.268	40.7	4213.9	O K
10080 min Winter	0.720	0.220	40.7	3459.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
360 min Winter	14.037	0.0	6708.9	364
480 min Winter	11.286	0.0	6651.1	482
600 min Winter	9.522	0.0	6604.5	598
720 min Winter	8.282	0.0	6567.0	714
960 min Winter	6.640	0.0	6512.5	946
1440 min Winter	4.854	0.0	6459.7	1400
2160 min Winter	3.541	0.0	12802.5	2052
2880 min Winter	2.828	0.0	13113.9	2344
4320 min Winter	2.055	0.0	12469.7	3212
5760 min Winter	1.637	0.0	15777.6	4096
7200 min Winter	1.371	0.0	16526.8	4968
8640 min Winter	1.186	0.0	17150.9	5792
10080 min Winter	1.049	0.0	17698.0	6560

Hydrock Consultants Ltd		Page 3
.	South Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File South Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 11.959

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)
0 4 3.000	4 8 3.000	8 12 3.000	12 16 2.959				

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	From: To: (ha)
0 4 0.000	

Hydrock Consultants Ltd		Page 4
.	South Catchment	
.	HE Cyber Park, Cheltenham	
.		
Date 10/09/2019	Designed by GLG	
File South Catchment.SRCX	Checked by RJH	
Innovyze	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	15500.0	1.000	17315.6

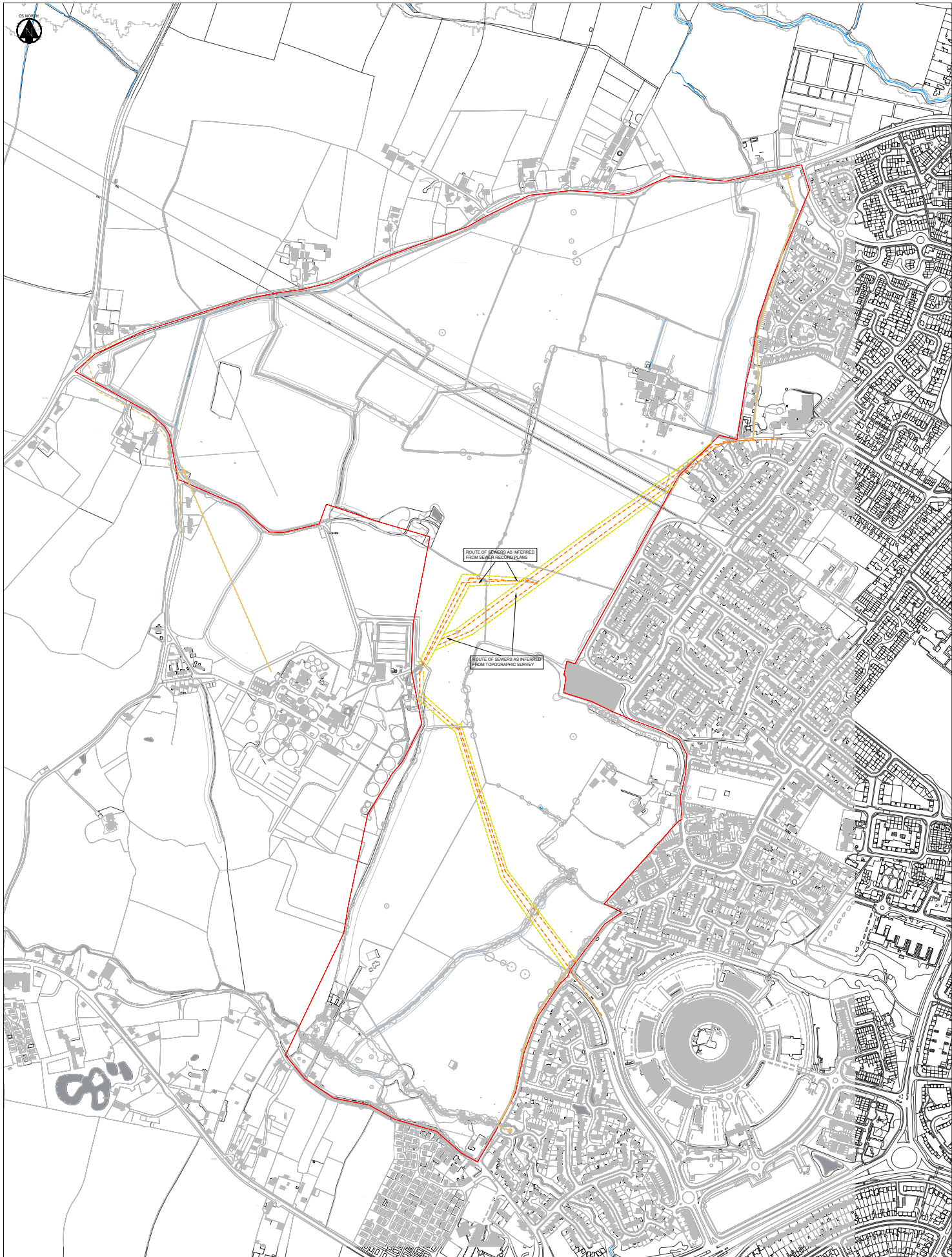
Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0264-4070-1500-4070
Design Head (m)	1.500
Design Flow (l/s)	40.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	264
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	40.7	Kick-Flo®	1.049	34.3
Flush-Flo™	0.485	40.7	Mean Flow over Head Range	-	34.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.4	0.800	39.1	2.000	46.7	4.000	65.3	7.000	85.8
0.200	27.1	1.000	35.9	2.200	48.9	4.500	69.2	7.500	88.7
0.300	39.2	1.200	36.6	2.400	51.0	5.000	72.8	8.000	91.5
0.400	40.4	1.400	39.4	2.600	53.0	5.500	76.3	8.500	94.3
0.500	40.7	1.600	42.0	3.000	56.8	6.000	79.6	9.000	96.9
0.600	40.4	1.800	44.4	3.500	61.2	6.500	82.7	9.500	99.5



<div>Key</div> <div><div><div><div></div><div></div><div></div></div><div>Existing combined sewer</div></div><div><div><div></div><div></div><div></div></div><div>Existing foot sewer</div></div><div><div><div></div><div></div><div></div></div><div>Existing foot rising main</div></div><div><div><div></div><div></div><div></div></div><div>Extent of sewer assessment</div></div><div><div><div></div><div></div><div></div></div><div>Existing foot pumping station</div></div></div>	<div>REVISED</div> <div><div><div></div><div></div><div></div></div><div></div></div> <div><div><div></div><div></div><div></div></div><div></div></div> <div><div><div></div><div></div><div></div></div><div></div></div> <div><div><div></div><div></div><div></div></div><div></div></div> <div><div><div></div><div></div><div></div></div><div></div></div> <div><div><div></div><div></div><div></div></div><div></div></div> <div><div><div></div><div></div><div></div></div><div></div></div> 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Project name	Cyber Park, Cheltenham		
Design note title	Geotechnical and Geo-environmental Review and Masterplan Validation		
Document reference	12619-HYD-XX-XX-GE-TDN-0002		
Author	Claire Moreira		
Checked	Allan Bell		
Revision	Rev 1		
Date	6 September 2019	Approved	✓

1. INTRODUCTION

This technical note summarises the results of a preliminary desk based geotechnical and geo-environmental review, utilising freely available open source data, updated with historical Desk Study Information for a site known as Cyber Park, Cheltenham. No walkover has been undertaken at the current time and this Technical Note should be considered for preliminary use only.

This Technical Note is a high-level review of updated project information received on the 5th September 2019 and updates the previous preliminary desk based geotechnical and geo-environmental review (Hydrock document C-12619-TDN001, dated 5th August 2019).

2. INFORMATION

Reference is made to an un-numbered CAD drawing with the file reference '19123_Masterplan and constraints_190827'. There is no key attached to the drawing and therefore various elements of details shown on the drawing have been inferred. It is noted that proposed development is shown on the adjacent Severn Trent Water sewage treatment works (STW) to the west of the site however, these are outside of the 'red line' and therefore have been generally ignored for the purposes of this Technical Note. If this assumption is not correct, this note will require updating.

An historical Desk Study has been provided since the previous version of this review. This provides Information, for the eastern part of the site (as indicated by the red line) and is reported in: Wardell Armstrong LLP. December 2015. 'Land at Hayden, Cheltenham. Phase 1 Desk Study Report'; Ref LE13253: Report Number: 001. Undertaken for the Northern Trust Company Ltd and Barberry Cheltenham. Hydrock are not aware of the status with regards to assignment of this report, and have assumed there is no reliance upon it. As such, and due to the fact, the report only covers part of the current site, the above report has been used as background information.

3. MASTERPLAN VALIDATION

With reference to the provided masterplan CAD drawing ('19123_Masterplan and constraints_190827'), and working on the assumption that the site boundary does not extend beyond the 'red line' and does not include the Severn Trent Water sewage treatment works, whilst there are significant further assessment works to be undertaken (and likely localised remediation works and engineering solutions required with regards to foundations etc., there are no geotechnical and geo-environmental constraints which need addressing further as part of the masterplan.

Please see preliminary recommendations and further works later in this TDN.

4. LOCATION

The site is 78 hectares in area and is located to the west of Cheltenham, between the B4634 to the north and the B4063 to the south. The nearest postcode is GL51 0XP, and the National Grid Reference for the approximate centre of the site is 391252E,223568N.



Proposed Development

As detailed in the Deloitte 'Cyber Central: The emerging proposition and occupier brief' April 2019 and shown on the preliminary masterplan (Figure 1), the proposed site will comprise a sustainable mixed-use urban extension for Cheltenham, providing:

- up to 1, 100 new homes;
- 45 acres of employment land (in the southern extent) including a cyber related business park; together with
- areas of open space.

Figure 1: Preliminary Masterplan (subject to ongoing assessment)

5. BACKGROUND DATA

Site Setting

As indicated on Figure 2 and Figure 3, the site currently comprises a number of hedge lined open fields, used for arable crops and grazing, is generally flat and slopes gently down to the west and south-west from approximately 50m OD to approximately 35m OD.

There are a number of recognised footpaths crossing the site (predominantly in the eastern half of the site).

Hope Farm is located in the north-eastern part of the site, accessed via a track off Hope Orchard (road) from the east. Hayden Farm is present in the north-west corner of the site. Fiddlers Green Farm is present in the south-west corner of the site. In addition to the above noted farm houses and farm yards, there are a small number of small buildings scattered across the site.

Existing residential development is present to the immediate east of the site, together with a school (Springbank Primary Academy) to the northeast. GCHQ is present to the south-east of the site.

A gas installation compound is present to the north-west of the site.

A sewage treatment works is present to the immediate west of the southern central part of the site.

High voltage overhead powerlines cross the northern part of the site.



Figure 2: Aerial photograph of the site



Figure 3: Extract of the Ordnance Survey Map of the site

Geology and Hydrogeology

The geology (as indicated by the British Geological Survey mapping) comprises:

- Cheltenham Sand & Gravel, present as an isolated pocket in the central north-eastern part of the site; comprising fine to medium sand with quartz and limestone gravel; or
- Alluvium, present as an isolated band on the southern extent of the site, following the course of Hatherley Brook, comprising clay, silt sand and gravel, with possible layers of peat; over
- Charmouth Mudstone Formation (Lias Group), present across the vast majority of the site, comprising dark grey laminated shales and blue grey mudstone (weathers to clay) and local limestones.

There are data in the BGS archives relating to historical boreholes in the site, including a borehole located in the northwest (SO925W83), in the west (SO92SW82) and several in the central area of the site (SO92WS100). These indicate the ground conditions to comprise:

- Made Ground to approximately 0.60m; over
- Charmouth Mudstone Formation, to a depth of approximately 4.5m bgl (15 feet), comprising firm becoming stiff blue grey or brown clay, with shale bands and becoming hard blue clay.

Groundwater was not encountered in the historical boreholes.

The Cheltenham Sand & Gravel and Alluvium are classified by the Environment Agency as Secondary Aquifers and the Charmouth Mudstone Formation is classified as a secondary (undifferentiated) aquifer.

The site is not within a Groundwater Source Protection Zone.

There are two historical landfills within 250m of the site. Both appear to be small scale operations. However, the nature of wastes accepted are not given:

- The first is located at approximately 250m to the east of the north-eastern part of the site, identified as Swanbrook Grill, operating from 1980 to 1993.
- The second is located at approximately 200m to the west of the south-western extent, identified as Market Garden, land at Violet Villa, however no further information is provided regarding this landfill.

Mining and Shale Gas

The site lies outside the Coal Mining Reporting Area and consequently the risk associated with coal mining can be discounted.

The historical plans do not identify potential surface excavation features and as such, significant and ongoing surface mining is discounted. Such features were not recorded within the site area.

The site has been identified as not being in a licenced or prospective area of onshore oil and gas activity according to the Department of Energy and Climate Change website. However, the geology of the site does have the potential for shale gas resources.

Hydrology

There is a water course (Hatherley Brook) present in the south of the site which runs broadly east to west and a small pond is present in the central-western part of the site. A small ditch / stream flows to the south-west across the southern part of the site and joins Hatherley Brook in the south-west corner of the site.

History

The previous review has been updated based on the historical maps presented in the Wardell Armstrong Desk Study, (2015), which covers part of the site.

This review indicates that the site has generally been open fields, from as early as 1884. Farm buildings, identified as Whitehall are present in the central-western area of the northern part of the site. At this time, a brick works, including pits and ponds was located at approximately 250m to the east of the north-eastern part of the site (this brick works site is later noted as a landfill). A spring is noted in the north-western extent. Fiddlers Green farm buildings are present in the south-western corner.

By 1903, Woodbine Cottage was constructed in the central-northern area.

By 1924, a sewage works was constructed to the southwest of the site (Cheltenham Corporation), including tanks and filter beds.

During the 1930s, several drains are noted running along field boundaries.

By 1960, a footpath is shown running from Fiddlers Green Farm in the southwest heading south-west to north-east towards extensive residential development located to the immediate north-east and east of the site.

Whitehall farm and Woodbine cottage appear to have been demolished at some time post 1960.

Review of detailed (and better-quality maps) is required to finalise the historic review of the site.

Off-site, the major historical development is the construction of the Sewage Works (Cheltenham Corporation) to the west of the site by 1924. These continued to expand through the 20th century until the late 1970s. In addition, significant residential development has occurred to the east of the site.

Unexploded Ordnance (UXO)

The site lies in an area where the potential risk of is moderate according to Zetica.com.

6. POTENTIAL RISKS

Based on the above preliminary review, the following potential risks, requiring further investigation and assessment, are identified.

With regard to geo-environmental risks, there is the potential for:

- Made Ground (along with the potentially containing elevated concentrations of metals, metalloids, asbestos, PAH and petroleum hydrocarbons) to be present at the location of the former, now demolished farmyards or buildings (e.g. Whitehall farm buildings and Woodbine cottage), or at the location of current farmyards or buildings (e.g. Hope Farm, Hayden Farm, Fiddlers Green Farm and the small buildings scattered across the site).
- Hydrocarbon fuels, lubricants, and solvents (including leakage from USTs, the pipework between tanks and pumps, and general spillage, together with uncontrolled disposal and spillage from waste receptacles), from use at the location of the former, now demolished farmyards or buildings (e.g. Whitehall farm buildings and Woodbine cottage), or at the location of current farmyards or buildings (e.g. Hope Farm, Hayden Farm, Fiddlers Green Farm and the small buildings scattered across the site).
- Hydrocarbon fuels, lubricants, and solvents due to leaks from farm machinery.
- Use of agricultural pesticides and herbicides in the fields. Whilst generally considered a low risk, this will require confirmation.
- Asbestos from current and former building and structures;
- Heavy metals (arsenic, cadmium, chromium and mercury), dioxins and to a lesser extent PCBs, PAHs and asbestos from sewage sludge;
- Potential for ground gases from localised Made Ground, natural Alluvium (present at the south of the site) and off-site Made Ground (landfills).
- Moderate UXO risk. Therefore, a full UXO Desk Study screening assessment is required ahead of any intrusive works, to confirm the level of risk and precautions necessary during any intrusive works.

Whilst the site is anticipated to generally be a low risk overall, there will be areas of the site with more significant risks and through investigation and assessment will be required.

With regard to geotechnical risks, the following are potentially present:

- Uncontrolled Made Ground (variable strength and compressibility), associated with the area of the former and current farm yards and buildings. Whilst Made Ground is likely to be present, the extent of the Made Ground is likely to be relatively limited in the context of the total site.
- Soft / loose compressible ground (low strength and high settlement potential) possibly within the Cheltenham Sand & Gravel and more likely in the Alluvium. Given the distribution of these deposits, this risk is likely to low (due to limited presence).
- Shrink / swell of the clay fraction of soils under the influence of vegetation. The Charmouth Mudstone Formation is generally of moderate heave potential (but may sometimes be of high heave potential). The

Alluvium is likely to be low to medium heave potential and the Cheltenham Sand & Gravel is likely to be low heave potential and / or non-plastic soils.

- Lateral and vertical changes in ground conditions. Where superficial deposits are present, these may vary significantly, with soils changing from clay to sand and gravel (in the limited Cheltenham Sand & Gravel and Alluvium) or from clay to limestone (in the Charmouth Mudstone Formation), across relatively short distances.
- Attack of buried concrete by aggressive ground conditions. Generally low risk in the Cheltenham Sand & Gravel Deposits and the Alluvium. However, the Charmouth Mudstone Formation may contain elevated sulphates and the presence of pyrite.
- Obstructions are generally not anticipated. However, foundations and obstructions will be present in the areas of the former and current farm yards and buildings.
- Loose Made Ground, leading to difficulty with excavation and collapse of side walls, may occur in the areas of the former and current farm yards and buildings.
- Shallow groundwater is expected in the Alluvium and Cheltenham Sand & Gravel. This may lead to groundwater flooding, excavation collapse and difficult excavation. Given the distribution of these deposits, this risk is likely to low (due to limited presence).

7. PRELIMINARY RECOMMENDATIONS

Based on the above review, preliminary recommendations are listed in Table 1. It should be noted that these recommendations are based on freely available desk study data and experience only; without the benefit of site-specific investigation data. The preliminary recommendations presented below are subject to review and change in light of the investigation, assessment and design.

Table 1: Preliminary Recommendations

Site Preparation, Groundworks, Excavation and Earthworks,	<p>Topsoil should be removed from beneath all earthworks, buildings and hardstanding areas. This will generate significant volumes of Topsoil.</p> <p>Excavations should be readily achievable using standard plant, although hard digging may be encountered where mudstone or shale bands are present in the Charmouth Mudstone Formation.</p> <p>Obstructions are likely in the area of the former and current farm yards and buildings and may require breaking equipment or heavy-duty plant to remove them.</p> <p>Excavations in the Charmouth Mudstone Formation are likely to be stable in the short to medium term. However, excavations in the Cheltenham Sand & Gravel, the Alluvium and any Made Ground, may be prone to collapse.</p> <p>Water seepages into excavations are likely in the Alluvium and Cheltenham Sand & Gravel and may require specialist dewatering (especially in Winter and Spring). Significant water seepages into excavations are unlikely in the Charmouth Mudstone Formation and should be adequately controlled by sump pumping.</p> <p>Excavated soils generally should be suitable for reuse. However, the soils are likely to require drying to allow placement to a formal Earthworks Specification:</p> <ul style="list-style-type: none"> • Soils of the Charmouth Mudstone Formation (the vast majority of the soils expected to be excavated) are unlikely to be suitable for modification due to the risk of sulphate heave and should only be air dried. • The sandy and gravelly parts of the Alluvium and Cheltenham Sand & Gravel deposits may only require excavation and free draining and air drying to allow placement. Although the volume of these soils excavated are likely to be low. • Areas of Alluvium with a notable amount of clay present would likely require modification to allow placement. Although the volume of these soils excavated are likely to be low.
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	<ul style="list-style-type: none"> If modification is proposed, care will be needed to ensure that modified soils do not come into contact with the sulphate bearing parts of the Charmouth Mudstone Formation.
Foundations	<p>A minimum foundation depth of 1.0m bgl is considered appropriate at this stage, although this is subject to the proven heave/volume change potential of the soils.</p> <p>Assuming levels remain at approximately existing ground level, foundations are likely to vary across the site and are likely to comprise:</p> <ul style="list-style-type: none"> Strip/trench fill foundations in the granular Cheltenham Sand & Gravel (where medium dense or better) and the Charmouth Mudstone Formation (where tree influence is <2.5m bgl); The southern part of the site is proposed for employment end use and therefore pad foundations bearing into the Charmouth Mudstone Formation or cut to fill earthworks (when placed to a suitable Specification) are likely to be suitable. Piled foundations, where soils are proven to be soft, or loose and unsuitable for improvement by vibro-stone column placement, or deepening due to trees is >2.5m bgl. It is anticipated, based on the preliminary Masterplan and the limited distribution of the Alluvium, that foundations will not be required within the zone of Alluvium present at the southern extent of the site. <p>Deepening of foundations/heave protection is likely to be required to allow for the effects of trees.</p>
Floor Slabs	<p>Suspended floor slabs are recommended for residential dwellings due to the likely presence of medium/high volume change potential clay soils.</p> <p>Ground bearing may be possible locally where granular (non-shrinkable) soils are proven.</p> <p>Suspended floor slabs are recommended for office and small-scale commercial units because of the likely presence of medium/high volume change potential clay soils.</p> <p>Ground bearing floor slabs on cut to fill earthworks (when placed to a suitable Specification) are likely to be suitable for any large scale 'shed' type buildings.</p>
Roads	<p>A design CBR of 2.5% is recommended at this stage, although this may reduce (<2.5%) in areas of Made Ground or where soft soils are encountered at formation level.</p>
Soakaways	<p>Soakaway drainage may be considered potentially is considered unsuitable due to the likely presence of low permeability clays and mudstones associated with the Charmouth Mudstone Formation.</p> <p>At this stage, Hydrock would recommend that soakaway drainage is not included as a water management methodology.</p>
Buried Concrete	<p>Assume a Design Sulfate Class - DS- 3 and ACEC Class AC-3. Equivalent to Design Chemical Class DC-3 for a 50-year design. However, this will depend upon the results of testing.</p>
Water Supply Pipework	<p>Likely, based on existing data, to be standard pipework as long as Made Ground is managed during the earthworks, but confirmation should be sought from the water supply company, following completion of intrusive works.</p>
Remediation	<p>Remediation is likely to be required in the area the former and current buildings and farm yards. However, Hydrock believe this will predominantly be dealt with as an earthworks and materials management process, with possibly some bio-remediation or excavation and off-site disposal of hydrocarbons.</p> <p>Any Asbestos Containing Materials encountered will need to be disposed of off-site.</p>
Protection from Ground Gases	<p>Radon protective measures are unlikely to be required.</p> <p>The requirement for ground gas protection measures will be confirmed following the site investigation and monitoring. However, based on the available data, it is considered unlikely that gas protection measures will be required.</p>

8. FURTHER WORKS

Based on this preliminary assessment, Hydrock would recommend a tiered approach to the geotechnical and geo-environmental assessment of the site, comprising:

- ***To support the Planning Application:*** A full Phase 1 Desk study, inclusive of a UXO Desk Study, to assess the risk of Unexploded Ordnance at the site and to formulate a formalised Preliminary Conceptual Ground Model of the site to determine geo-environmental and geotechnical site conditions, and identify key risks to development. Potentially, the Local Planning Authority may require preliminary intrusive data at this stage, however, Hydrock consider this unlikely.
- ***To support the Master Planning and Development Stage:*** A preliminary, reconnaissance Phase 2 Ground Investigation to refine the Preliminary Conceptual Site Model, quantify the geo-environmental risks to identified receptors and provide a preliminary geotechnical assessment of the site. The Preliminary intrusive site investigation would need to include soil infiltration testing at selected locations across the site to confirm that infiltration drainage is unlikely. It is envisaged that the intrusive works will comprise trial pits broadly spaced across the site to enable confirmation of geological boundaries, together with a number of trial pits and boreholes to target the former farm and other buildings. Samples will be collected for outline geotechnical and contamination testing.

Following the above preliminary assessment, further stages of detailed investigation and or risk assessment will be necessary as the project advances through the development process.

Project name	Cyber Central Vision
Design note title	Air Quality Due Diligence
Document reference	C-12619
Author	Adam Dawson
Revision	P04
Date	24 April 2019

Overview

Cyber Central Vision

1. INTRODUCTION

This Hydrock Technical Design Note has been produced in support of a potential development (Cyber Central Vision) to the west of Cheltenham.

This technical design note summarises Hydrock's proposed assessment protocol and provides an initial desktop site appraisal suitable for assessment of air quality related site constraints.

The proposal is to redevelop areas of arable land and green space, into a mixed-use Cyber Park, which is proposed to contain residential, leisure & retail, business & industry and R&D plots. The site is under the jurisdiction of both Cheltenham Borough Council (CBC) and Tewkesbury Borough Council (TBC). With the site being partially located within CBC's borough wide Air Quality Management Area (AQMA) for the annual NO₂ objective.

2. INITIAL DESKTOP SITE APPRAISAL

2.1 Preliminary Assessment

The proposed development site is located to the west of Cheltenham, in the area of Fiddlers Green. The development is in an area that is urban in nature with the surrounding areas used primarily for residential and the GCHQ complex.

Worst case air quality concentrations within the residential developments are likely to be equal to the background for the area with the addition of local traffic from the Old Gloucester Road. According to the Defra background maps, the annual average NO₂ concentration at the development is approximately 14.0 µg/m³; which is below the UK limit of 40 µg/m³. Whilst there is no data to estimate the concentrations at the site or at nearby roadside locations, the residential plots, where the air quality objectives apply, are set back from the road and therefore are likely to have concentrations similar to the background NO₂ and are unlikely to be a significant barrier to development.

The nearest diffusion tube monitoring site within the area is located on Princess Elizabeth Way, approximately 10 km away from the development. This tube has been classified as roadside and has been installed to assess pollution on the heavily used Princess Elizabeth Way.

A summary of the diffusion tube monitoring is presented in Table 1. In 2018, the last available year of monitoring data, none of the sites exceeded the annual NO₂ objective.

Table 1 – Cheltenham Borough Council air quality monitoring in the area of the proposed development

Location	Distance to Kerb (m)	2013	2014	2015	2016	2017	2018
Diffusion Tubes: Annual Mean Concentration (µg/m ³)							
340 Gloucester Road (Roadside)	2	37.6	36.3	38.7	35.9	38.6	35.3
Princess Elizabeth Way North (Roadside)	1.2	n/a	n/a	n/a	n/a	n/a	38.4 ¹
Princess Elizabeth Way South (Roadside)	1.3	n/a	n/a	n/a	n/a	n/a	31.2 ²

Further to the above, a dispersion modelling report³ undertaken for CBC and finalised on the 31st October 2019 concludes:

“As expected, all discrete receptor locations which report annual mean NO₂ concentrations to be above or within 10% of the AQS objective, are located within the existing borough-wide AQMA, limited to roadside locations of junctions where key arterial roads meet. Notable roads include: A40 Gloucester Road, A4013 Princess Elizabeth Way.”

The above diffusion tubes are not likely to be representative of the development site but is an indication that NO₂ concentrations are elevated on major roads where the development will impact. This is significant as the indicative site plan suggests that access to the site will utilise the main roads entering the west of Cheltenham (A40, Princess Elizabeth Way and the B4634/A4019). Given the above diffusion tube results and evidence from recent dispersion modelling study, the impacts are likely to be assessed assuming a high background concentration. Increases of around 0.2-0.4 µg/m³, due to the development, have the potential to trigger a Moderate/Major effect within the Environmental Impact Assessment process. This will need to be determined however at the modelling stage once traffic data is available.

Due to the nature of the development (residential/retail/business), it is anticipated that emissions from energy/hot water generation should be considered for assessment. If these emissions are found to present an adverse impact, suitable mitigation could be installed to mitigation these impacts. Therefore, any emissions are unlikely to serve as a barrier to development.

There are nearby local habitat sites (Griffiths Avenue LNR and Badgeworth SSSI), given their distance from the development site (approximately 1.5km) and the likely traffic distribution, it is not thought air quality impacts at local habitat sites are thought to be a barrier to development.

¹ Data has been annualised due to less than 75% data capture

² Data has been annualised due to less than 75% data capture

³ Bureau Veritas.2019. Cheltenham Borough Council Cheltenham Detailed Modelling Study

2.2 Constraints

The following constraints for the development of this site, relating to air quality have been identified below:

- Residential plots near Old Gloucester Road (B4634) maybe required to be set back slightly from the road, to reduce impacts from road traffic.
- There are anticipated to be a large number of vehicle movements associated with the development site, therefore a full air quality assessment will be required. With the greater impacts anticipated to be at current receptors near the A40, Princess Elizabeth Way and B4634/A4019. A compliance by design approach is recommended in order to set in place measures that improve air quality in the area and prevent further declarations of AQMAs. This will involve additional modelling work to assess the best options, which will be done in consultation with CBC. This is key to ensuring that current measures to reduce pollution in this area are not hindered.
- Additional monitoring is already being undertaken by CBC and will be used in conjunction with their detailed modelling assessment carried out in 2019 to establish a robust baseline.
- Odour from the nearby Hayden Sewage Treatment works has the potential to be a constraint on plots that will expect a higher level of amenity (residential/offices etc). This is covered in more detail in the document the Hydrock document (CBP-HYD-XX-ZZ-RP-Y-3002_P03 -Odour).

3. AIR QUALITY ASSESSMENT FOR PLANNING

The development site currently has no vehicle trips associated with it. It is anticipated that traffic movements will be greater than 100 AADTs, the Institute for Air Quality Managements (IAQM) recommended threshold to trigger an air quality assessment, within an AQMA. Therefore, an assessment of the effects of the development on the local area will be required. As residential units are to be incorporated within the scheme an assessment of local air quality on these units will be required. Any assessment would include a construction dust assessment which complies with IAQM Guidance on the assessment of dust for demolition and construction.

If it is anticipated that emissions from a single energy/hot water generation stack will be greater than 5mg/NOx/s an assessment of these emissions will need to be assessed within any air quality assessment.

The above is deemed accordance with best practice and would involve a dispersion modelling study of the impacted area. Where applicable, sensitivity analysis should be undertaken to the emissions from the UK vehicle fleet and any proposed mitigation. However, the level of detail of the assessment would be defined and set out at Environmental Impact Assessment scoping stage, in consultation with CBC.

4. LEGISLATION

Any assessment undertaken need to consider the impacts of NO₂, PM₁₀ and PM_{2.5} and it is recommended that the following guidance be consulted:

- The Air Quality Standards regulations⁴
- The revised National Planning Policy Framework, released in February 2019⁵

⁴ Air Quality Standards Regulations 2010.

⁵ Department for Communities and Local Government, "National Planning Policy Framework," 2019, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf.

- Cheltenham 2019 Air Quality Annual Status Report⁶
- Defra Local Authority Technical Guidance TG16⁷
- IAQM Guidance on the assessment of dust for demolition and construction⁸
- IAQM Land use Planning and Development Control: Planning for Air Quality⁹

⁶ Cheltenham Borough Council.2019. Air Quality Annual Status Report.

⁷ Defra, "LAQM Technical Guidance LAQM.TG16," 16.

⁸ IAQM, "Guidance on the Assessment of Dust from Demolition and Construction" (Institute of Air Quality Management (IAQM)), February 2014), <http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf>.

⁹ IAQM, "Land-Use Planning & Development Control: Planning for Air Quality."

Project name	Cyber Park, Cheltenham
Design note title	Odour Due Diligence
Document reference	CPC-HYD-XX-ZZ-RP-Y-3002_P03
Author	Adam Dawson MIAQM
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Date	21 October 2019

1. INTRODUCTION

This Hydrock Technical Design Note has been produced in support of a potential development (Cyber Central Vision) to the west of Cheltenham.

This technical design note summarises Hydrock proposed assessment protocol and provides an initial desktop site appraisal suitable for assessment of odour related site constraints.

The proposal is to redevelop areas of arable land and green space, into a mixed use “Cyber Park” which is proposed to contain residential, leisure & retail, business & industry and R&D plots. The site is under the jurisdiction of Cheltenham Borough Council and is within 100m of Hayden Sewage Treatment works which has a population equivalent of 130,562.

2. INITIAL DESKTOP SITE APPRAISAL

2.1 Preliminary Assessment

The proposed development site is located to the West of Cheltenham, in the area of Fiddlers Green. The development is in an area that is urban in nature with the surrounding areas used primarily for residential use and the GCHQ complex.

The development site boundary is within 100m of Hayden Sewage Treatment works (STW), operated by Severn Trent Water. This STW is medium in size, has a population equivalent of 130,562 and contains preliminary, primary and secondary treatments stages with storm water and sludge handling facilities; including open air cake drying pads.

As of writing, three previous assessments are available to contribute towards a desktop site appraisal. As only two reports utilise site specific data, the report written by WSP¹ has not been considered further.

Two reports, which have been produced by MWH^{2,3} use site specific data to estimate the odour exposure surround Hayden STW. They utilise onsite sampling data from 2009, 2013 and 2016. Data was primarily used from the 2016 survey, which was conducted during winter conditions, consequently odour emission rates were

¹ WSP.2017. Hayden Sewage Treatment works odour assessment.

² MWH. 2016. Hayden WwTW Odour Impact Assessment.

³ MWH. 2018. Hayden WwTW Odour Impact Assessment. [Addendum Report]

lower than previous surveys. To allow the model to account for seasonal variation in odour emission rates the following approaches has been adopted.

- *“Where there is no significant difference between summer measured data and measured winter data, a typical summer multiplier of 2 will be utilised to provide a conservative basis of assessment.*
- *With respect to ASP anoxic tank and the storm tank residues previous historical measured data is much higher (16 times and 67 times greater respectively) than expected. Based on knowledge of other sites a conservative summer multiplier of 5 will be utilised.”*

It appears that the corrected emission rates are in line or greater than the few summer sampled emission rates available, with the exception of the inlet works, ASP anoxic tank and the storm tank. The uncertainty around the inlet emission rates will be addressed by the proposed upgrades to the works, as discussed below. Based on the reports the contribution to overall site emissions from the storm tanks and ASP anoxic tank is currently 2.5% of overall site emissions and on balance unlikely to significantly effect conclusions.

The report utilises the accepted AERMOD dispersion model and certain modelling techniques to derive its conclusions: summer peaking emission rates, utilisation of terrain data, building effects and worst case of 5 years of meteorological data from an appropriate met station.

As part of these reports' mitigation options were explored to reduce this impact. The current setback distances (cordon sanitaire) on the masterplan appears to be based on scenario 8 within the latest MWH report³. Scenario 8 assumes that the following upgrade works have been undertaken to Hayden STW:

- covering of the inlet pipework;
- operation changes to the return liquor tanks;
- replacement of the covers on the imported PFT tanks;
- the removal of the current sludge OCU and combined with a new imported sludge OCU (odour concentration of 1000 OUE/m³ at the outlet);
- covering of the west inlet works and extracted to OCU (odour concentration of 1000 OUE/m³ at outlet);
- covering of the PST distribution chamber and Centrate Balancing tanks an extracting to OCU (odour concentration of 1000 OUE/m³ at outlet);
- sludge cake stored in original bays and not a new cake silo.

Therefore, the cordon sanitaire within the current masterplan Is only applicable if the above upgrades have been completed, otherwise there is a greater risk of an adverse odour impact.

3. CONSTRAINTS

The following constraints for the development of this site, relating to odour have been identified below:

- At this early stage it is not recommended that blocks B1 and B5 be used for commercial plots that are expecting amenity that is near residential level, without mitigation. This is due to predications of greater than 3 OUE/m³ covering these plots. Onsite odour assessment work and future work my change these recommendations.
- High-level short-term odour events, such as plant breakdown are not represented by the model and may give rise to increased levels of odour. Depending on the frequency these may or may not give rise to complaints.

4. FURTHER WORK RECOMMENDATIONS

It is advised that further work is undertaken to negate any residual risk associated with uncertainty in odour modelling. At this stage it is recommended that in addition to further assessment during the planning stage, an onsite odour assessment is undertaken to assess real world conditions.

5. LEGISLATION

Any assessment undertaken needs to consider the impacts of odour on the development and it is recommended that the following guidance be consulted:

- The revised National Planning Policy Framework, released in February 2019⁴
- Defra Local Authority Technical Guidance TG16⁵
- Guidance on the assessment of odour for planning 2018 v1.1
- IAQM Land use Planning and Development Control: Planning for Air Quality⁶
- Odour Control in Wastewater Treatment – A technical Reference Document – UKWIR
- Odour Guidance for Local Authorities, withdrawn by Defra in 2017

⁴ Department for Communities and Local Government, "National Planning Policy Framework," 2018, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf.

⁵ Defra, "LAQM Technical Guidance LAQM.TG16," 16.

⁶ IAQM, "Land-Use Planning & Development Control: Planning for Air Quality."

Project name	Cyber Park, Cheltenham		
Design note title	Noise and Vibration Due Diligence Report		
Document reference	CPC-HYD-XX-XX-RP-Y-1001-P02		
Author	Vince Taylor		
Revision	P02		
Date	11 December 2019	Approved	✓

1. INTRODUCTION

- 1.1.1 This document provides a review of the key noise and vibration issues associated with the proposed development of the Cheltenham Cyber Park scheme.
- 1.1.2 The scheme comprises a mixed-use technology park and residential development. The development is proposed on an area of greenfield broadly adjacent to GCHQ in Cheltenham.
- 1.1.3 This document sets out areas for consideration in relation to noise issues relating to the development site (existing conditions) and considerations for assessment of the construction and operational phases should development proceed.
- 1.1.4 A noise survey will be required in order to identify and characterise existing noise sources (i.e. water treatment works). This will allow us to establish potential building fabric design parameters and ventilation/glazing strategies, and to set fixed service plant noise limits.
- 1.1.5 The commercial traffic generated via the access road, and the noise generated impacting the new residential, will also need to be understood and included in the assessment.

2. SITE LOCATION

- 2.1.1 The site area is located around immediately west and north of GCHQ,
- 2.1.2 The location of the site overlaid with current masterplan proposals is shown in Figure 2.1

Figure 2.1: Site Location Plan



2.1.3 Initial observations of the site suggest that likely sensitive receptors will include built up residential areas the east as well as retained rural/agricultural properties to the north of the site.

2.1.4 External sensitive receptors may include public footpaths or bridleways and areas of historic significance.

2.2 Existing Noise Maps

2.2.1 Defra maintain noise maps in the vicinity of most major roads including the M5, this allows an initial indicative assessment of existing noise levels in the vicinity of the site.

2.2.2 Defra noise maps are modelled on a 10 m grid at a receptor height of 4 m above ground. This data is a product of the strategic noise mapping exercise undertaken by Defra in 2012 to meet the requirements of the Environmental Noise Directive (Directive 2002/49/EC) and the Environmental Noise (England) Regulations 2006 (as amended). Results are shown for two noise level indicators:

- » LAeq,16h - the annual average noise level (in dB) for the 16-hour period between 0700-2300.
- » Lnight - the night time annual average noise level (in dB) where night is defined as 2300-0700.

2.2.3 Figure 2.2 below outlines the wider area LAeq, 16h 16-hour average day noise level data as exists for the site.



Figure 2.2 Defra LAeq, 16h day noise levels parameter map.

2.2.4 Figure 2.3 outlines a closer view of the key area identified for development.

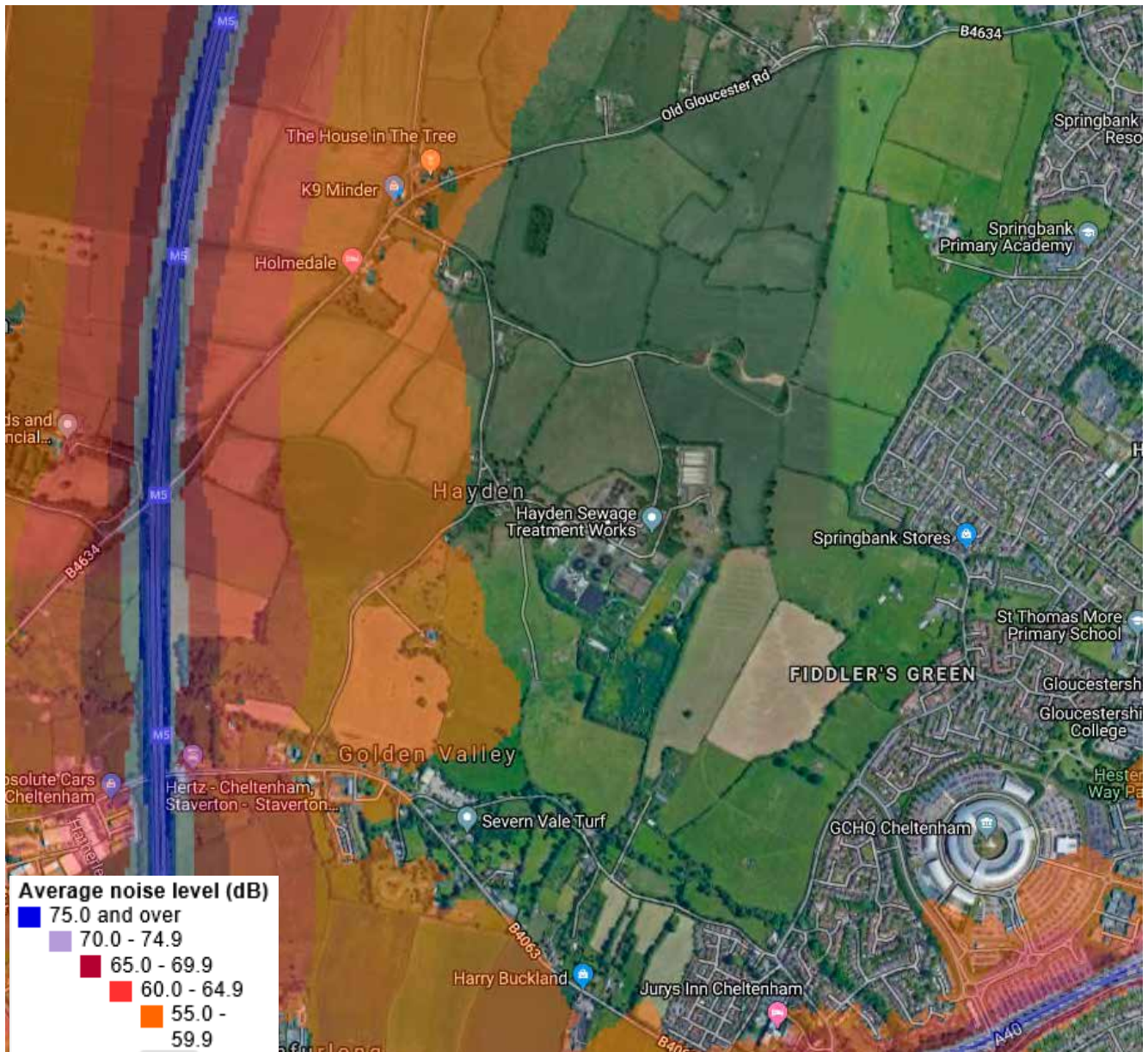


Figure 2.3 Focused Defra LAeq, 16h day noise levels parameter map

2.2.5 Figure 2.4 outlines the Lnight parameter noise map for the vicinity of the site.

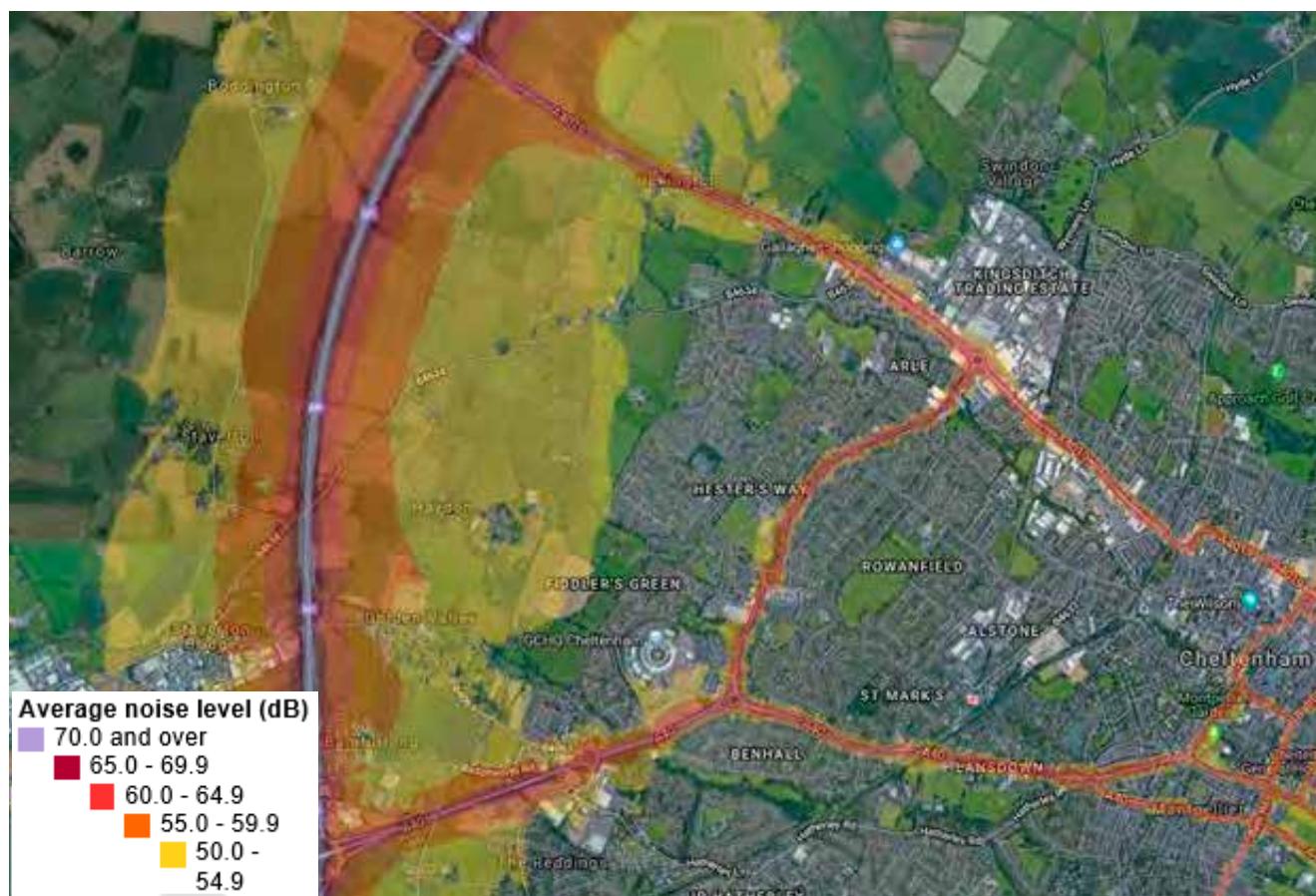


Figure 2.4 Defra LNight Parameter Map



Figure 2.5 Focused Defra LNight Parameter Map

- 2.2.6 The above maps indicate that during the daytime the majority of the site is expected to be exposed to noise levels <55dB LAeq, T. Some areas to the north west may be exposed to noise levels in the region of 55-59dB Leq, T.
- 2.2.7 During the night time period noise levels across the site can be expected to be in the range 50-55dB LAeq, T with some areas to the north west being in the range 55-59dB LAeq, T.
- 2.2.8 In principle design guidance for internal spaces is provided in Section 5 of this document.

3. POTENTIAL NOISE IMPACTS

3.1 Summary

- 3.1.1 The site is likely to be the source of noise and vibration impacts during both the construction and operational phases.
- 3.1.2 Given the potential scale of the development it may be appropriate to establish a screening opinion from the Local Authority with regards to the likelihood of being requested to undertake a formal Environmental Impact Assessment (EIA).
- 3.1.3 As part of this process (or a more traditional planning stage submission) an assessment of noise and vibration impacts and any mitigation is likely to be required to achieve permission, it is anticipated conditions will be associated with this permission.

3.2 Construction Phase

- 3.2.1 An assessment will likely be required to determine the impact of noise and vibration associated with construction activities on nearby noise sensitive receptors.
- 3.2.2 Construction noise generally comprises:
 - Moving plant and equipment servicing groundworks and activities such as piling and the ongoing construction works.
 - Temporary fixed power sources such as generators (large and small) for onsite and welfare facilities power provision.
 - Hand and power tools used within the construction process.
- 3.2.3 The assessment is being carried out in accordance with guidance provided within BS 5228:2009.
- 3.2.4 The significance of construction noise and vibration effects will then be determined through application of the guidance from BS 5228 Part 1 Annex E and BS 5228 Part 2. 'Code of practice for noise and vibration control on construction and open sites.
- 3.2.5 The assessment of noise levels due to construction activity and their significance will be dependent on the prevailing ambient and construction noise levels, as well as the level, duration, time of occurrence and frequency of the activity.
- 3.2.6 It may also be feasible to apply for a Section 61 Construction Noise Permit. Under Section 61 of the Control of Pollution Act 1974 a developer may apply to the local authority for prior consent to carry out noise generating construction or demolition works.
- 3.2.7 A Section 61 application would contain details of the construction activities and phasing to be carried out, the time of the works and also details any "best practicable means" mitigation measures to reduce the noise from the works.

3.3 Road Traffic/HGV Noise

- 3.3.1 The site is expected to give rise to road traffic associated with residents and employees within the proposed development.
- 3.3.2 Such road traffic will typically include transport movement to and from the site and the UK motorway network.

- 3.3.3 An assessment of road traffic noise including that identified above is likely to affect the site and surrounding receivers will be undertaken using baseline and future road traffic volume data obtained from the transport engineers and input into Datakustik CadnaA Version 4.5.151 (CadnaA) noise modelling software.
- 3.3.4 The assessment would predict the likely impact of future traffic associated with the proposed development on nearby noise sensitive receptors.
- 3.3.5 The impact would be assessed using the methodology provided in the Design Manual for Roads and Bridges (DMRB) or any other relevant guidance such as Department of Transport 'Calculation of Road Traffic Noise' (CRTN).
- 3.3.6 It should be considered that for noise levels to increase by 3dB road traffic feeding the site from existing roads would have to effectively increase to 200% of current. As such acoustic impacts may not be a primary driver in a planning application. Nonetheless an acoustic assessment of transport modelling for the site should be undertaken to verify the magnitude and significance of impacts anticipated.

3.4 Operational Phase

- 3.4.1 During operation the site will have fixed equipment and plant which could potentially be a source of noise, such items which require consideration include:
- Fresh and dirty air provision and extract equipment.
 - Refrigeration plant.
 - The site may also have independent or emergency power generation equipment.
 - Substations associated with its connection to the national power grid.
 - Operational noise sources such as those outlined above, which can be described as either:
 - External fixed plant.
 - Internal plant which generates noise to atmosphere
 - Commercial operations
 - Any other equipment
- 3.4.2 An assessment of the impact should be undertaken using Datakustik CadnaA Version 4.5.151 (CadnaA) noise modelling software and measurement data collected during field studies.
- 3.4.3 Where specific data is available to allow prediction of noise levels from plant and equipment associated with the Proposed Development, measurement data collected during field studies would be used for the setting of suitable noise limits at sensitive receptors.

4. PLANNING POLICY

4.1 National Planning Policy Framework

- 4.1.1 The 'National Planning Policy Framework, July 2018, Ministry of Housing, Communities and Local Government' (NPPF) sets out the United Kingdom Government's planning policies for adoption in England and how they should be applied.
- 4.1.2 The main aims of the NPPF are set out in section 11, as stated below.
- 4.1.3 'Planning policies and decisions should:
- a) encourage multiple benefits from both urban and rural land, including through mixed use schemes and taking opportunities to achieve net environmental gains – such as developments that would enable new habitat creation or improve public access to the countryside;
 - b) recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production;
 - c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;
 - d) promote and support the development of under-utilised land and buildings, especially if this would help to meet identified needs for housing where land supply is constrained and available sites could be used more effectively (for example converting space above shops, and building on or above service yards, car parks, lock-ups and railway infrastructure); and
 - e) support opportunities to use the airspace above existing residential and commercial premises for new homes. In particular, they should allow upward extensions where the development would be consistent with the prevailing height and form of neighbouring properties and the overall street scene, is well designed (including complying with any local design policies and standards), and can maintain safe access and egress for occupiers.'
- 4.1.4 The NPPF makes reference to guidance contained in 'Noise Policy Statement for England (NPSE), March 2010, Department for Environmental, Food and Rural Affairs' (NPSE). The NPSE is intended to apply to all forms of noise, other than noise occurring in the workplace and includes environmental noise and neighbourhood noise of all forms.
- 4.1.5 The NPSE provides advice regarding the impact of noise which should be assessed on the basis of adverse and significant adverse effect. However, the NPSE does not provide any specific guidance on assessment methods or the noise levels at which different effects would be applicable. Moreover, the document advises that it is not possible to have 'a single objective noise-based measure...that is applicable to all sources of noise in all situations. It further advises that the sound level at which an adverse effect occurs is 'likely to be different for different noise sources, for different receptors and at different times.
- ### 4.2 Planning Practice Guidance
- 4.2.1 The Ministry of Housing, Communities and Local Government publishes guidance on the internet in the form of the 'Planning Practice Guidance' (PPG). The guidance of PPG provides greater level of details in relation to the relevance of noise for planning following the introduction of the NPPF and NPSE.

- 4.2.2 It is stated under the heading ‘How to Determine the Noise Impact’ that the following should be considered by local authorities:
- ‘whether or not a significant adverse effect is occurring or likely to occur;
 - whether or not an adverse effect is occurring or likely to occur; and
 - whether or not a good standard of amenity can be achieved.’
- 4.2.3 The assessed noise should include the overall effect of the development, inclusive of the construction stage once completed.
- 4.2.4 The guidance process includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation as required by the NPSE.
- 4.2.5 The observed effects are defined in Table 4.1 which is taken from the section headed ‘How to Recognise when Noise could be a concern?’

Perception	Examples of Outcome	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid

Table 4.1: PPG

- 4.2.6 Under the section heading ‘What factors influence whether noise could be a Concern?’ the subjective nature of noise is discussed. It is stated that there is no simple relationship between noise levels and the impact on those affected. It is all dependent on how various factors combine in particular situations, which include:

- ‘The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- The spectral content of the noise (i.e. whether or not the noise contained particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features). The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.’
- ‘Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation can be found in the Building Regulations;
- In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in noise may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.
- If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.’

4.2.7 Similarly, to the NPSE, no specific noise parameters are defined in the guidance or target noise levels established for comparison.

4.3 Local Noise Policy- Cheltenham Borough Council

The Joint Core Strategy- Gloucester, Cheltenham and Tewkesbury provides policy items related to noise control or impact.

4.3.1 Policy Item SD4 -Design Requirements

1.1.1 iii. Amenity and space;

“New development should enhance comfort, convenience and enjoyment through assessment of the opportunities for light, privacy and external space, and the avoidance or mitigation of potential disturbances, including visual intrusion, noise, smell and pollution.”

4.3.2 Policy Item SD14-Health & Environmental Quality

“New development must:

1. Cause no unacceptable harm to local amenity including the amenity of neighbouring occupants;
2. Result in no unacceptable levels of air, noise, water, light or soil pollution or odour, either alone or cumulatively, with respect to relevant national and EU limit values;”

4.3.3 *Policy INF 1: Transport Network*

Planning permission will be granted only where the impact of development is not considered to be severe. Where severe impacts that are attributable to the development are considered likely, including as a consequence of cumulative impacts, they must be mitigated to the satisfaction of the Local Planning Authority in consultation with the Highway Authorities and in line with the Local Transport Plan

Developers will be required to assess the impact of proposals on the transport network through a Transport Assessment. The assessment will demonstrate the impact, including cumulative impacts, of the prospective development on:

3. Congestion on the transport network;
4. Travel safety within the zone of influence of the development;
5. Noise and / or atmospheric pollution within the zone of influence of the development;

4.3.4 *Policy INF5: Renewable Energy/Low Carbon Energy Development*

Proposals for the generation of energy from renewable resources, or low carbon energy development (with the exception of wind turbines), will be supported, provided the wider environmental, social or economic benefits of the installation would not be outweighed by a significant adverse impact on the local environment, taking into account the following factors:

6. The impact (or cumulative impact) of the scheme, including any associated transmission lines, buildings and access roads, on landscape character, local amenity, heritage assets or biodiversity;
7. Any effect on a protected area such as The Cotswolds AONB or other designated areas such as the Green Belt;
8. Any unacceptable adverse impacts on users and residents of the local area, including emissions, noise, odour and visual amenity;

4.4 *Policy Comments*

4.4.1 It is noted Policy Item SD14 supersedes prior Policy Items associated with noise:

- » RCN9- NOISE NUISANCE CAUSED BY SPORTS IN THE COUNTRYSIDE
- » EVT3-NOISE POLLUTION

5. DESIGN GUIDANCE

5.1 Overview

- 5.1.1 Assessment and design of the development will need to consider the below design standards, as well as giving consideration to additional noise assessment and modelling guidance outside the scope of this document.
- 5.1.2 However, based on the available noise maps it is expected the site will broadly fall into a medium noise exposure category.
- 5.1.3 The sound insulation requirements for building envelopes will ultimately depend upon the external noise levels incident at each façade.

5.2 British Standard 8233:2014

- 5.2.1 To address noise control in and around different types of buildings, appropriate guidance and criteria can be taken from:
- 5.2.2 'BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (British Standards Institution)' (BS 8233:2014).
- 5.2.3 The criteria are primarily intended to guide the design of new buildings and are flexible depending on the situational circumstances.
- 5.2.4 Table 5.1 provides the BS 8233:2014 guidance criteria for indoor ambient noise levels in residential dwellings when they are unoccupied.

Activity	Location	Daytime (07:00-23:00) LAeq(16hour) dB	Night-time (23:00-07:00) LAeq(8hour) dB
Resting	Living room	35	-
Dining	Dining room / area	40	-
Sleeping (daytime resting)	Bedroom	35	30

Table 5.1: BS 8233 Noise Limits – Residential

5.2.5 The indoor ambient noise level guidance of BS 8233:2014 is qualified by various notes, of which applicable ones are given in Table 5.2.

Qualifying Note	Description
Note 1	The table above provides recommended levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Groundborne noise is assessed separately and is not included as part of these targets, as human response to groundborne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.
Note 2	The levels shown in the table above are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in the table above.
Note 3	These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.
Note 4	Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L _{Amax,F} depending on the character and number of events per night. Sporadic noise events could require separate values.
Note 5	If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.
Note 7	Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable conditions still achieved.

Table 5.2: BS 8233 qualifying Notes

5.2.6 BS 8233:2014 also provides guidance on external noise levels for protection of private amenity spaces for residential demises.

5.2.7 It is desirable that the external noise level does not exceed 50dB LAeq,T. 55dB LAeq,T should be regarded as the upper guideline value.

5.2.8 However, it is recognised that these guideline values are not achievable in all circumstances where development might be desirable. For higher noise areas, such as city centres or urban areas adjoining a strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted.

5.2.9 Under such circumstances, the development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited on this basis.

5.3 Residential Design Commentary-DEFRA Noise Maps

5.3.1 We would advise in the first instance that residential development be designed to ensure internal noise levels in compliance with the guidance in BS 8233:2014.

5.3.2 Table 5.3 below assumes compliance with BS 8233:2014's internal noise criterion and shows the level differences for varying residential spaces within the proposed development.

5.3.3 The assessment should consider noise levels from all identified sources. The examples shown represent the highest-level differences required for each façade. The formal assessment will be based on the predicted data from the noise maps, environmental noise survey and manual noise measurements.

- 5.3.4 It should be noted that the highest-level difference (D) shown for bedrooms within Table 5.3 takes precedence.
- 5.3.5 Simple natural ventilation through the use of opening windows will provide a level difference (D) in the order of 10-15 dB. As shown in Figures 10 and 11, facades will be colour-coded to demonstrate the level of noise exposure and required ventilation strategy. The defining exposure level and relevant ventilation strategies can be defined as follows:
- 1.1.2 'Low Noise Exposure' – Suitable for natural ventilation, e.g. windows may remain open
- 1.1.3 'Medium Noise Exposure' – Suitable ventilation strategies may include; passive acoustic ventilation, acoustically treated ventilation with constantly running extract fans or whole house ventilation (MVHR).
- 1.1.4 'High Noise Exposure' - Suitable ventilation strategies are likely to be restricted to mechanical whole house ventilation (MVHR).

Façade	Room Use	Predicted External ('free-field' corrected)	Proposed Internal (Maximum)	Minimum Level Difference (D)
High Noise Exposure	Living Room1	60 +	35	25+
	Bedroom2	55 +	30	25+
	Bedroom3	70 +	45	25+
Medium Noise Exposure	Living Room1	50-60	35	15-25
	Bedroom2	45-55	30	15-25
	Bedroom3	60-70	45	15-25
Low Noise Exposure	Living Room1	35-50	35	0-15
	Bedroom2	30-45	30	0-15
	Bedroom3	45-60	45	0-15

Table 5.3: Façade Noise Assessment Criteria

Note 1: Living rooms (0700 to 2300);

Note 2: Bedrooms LAeq,8hr (2300 to 0700).

Note 3: Bedrooms LAmax,T (2300 to 0700)

- 5.3.6 Ultimately comprehensive baseline site survey assessments of noise should consider and capture data regarding day and night time noise levels across the site such that a noise model with all buildings proposed and the noise exposure categories properly established. This should be undertaken to inform glazing, ventilation and facade design proposals.

5.4 Commercial Design Commentary-DEFRA Noise Maps

- 5.4.1 It will be feasible to explore hybrid natural and mechanical ventilation design strategies for commercial development within the site, particularly where internal ambient noise level design criteria may be less onerous than for residential development.
- 5.4.2 The following best practice guidance will be used as reference to inform the acoustic design strategy for commercial development

» BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

» British Council for Offices Guide to Specification 2014

- 5.4.3 To address noise control in and around different types of buildings, appropriate guidance and criteria can be taken from:
- 5.4.4 'BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (British Standards Institution)' (BS 8233:2014).
- 5.4.5 The criteria are primarily intended to guide the design of new buildings and are flexible depending on the specific project circumstances.
- 5.4.6 The British council for Offices provides a range of best practice guidelines for the commercial property sector. The BCO guide to specification 2009, includes guidance in Section 8 regarding the acoustic environment of offices including guidance on finishes, external noise intrusion, internal sound insulation, building services noise, emergency plant noise, and vibration.
- 5.4.7 Guidance is based on existing guidelines taken from relevant British, European and International standards including BS 8233:2014, BS EN ISO 140-18:2006, BS 6472-1:2008 and the Association of Noise Consultants Guidelines ANC 9701:1997-Part 1: Noise from building services and ANC 9801:1998 -Part 2: Noise from external sources within buildings.
- 5.4.8 BS 8233:2014 proposes design ranges with regards to acceptable noise levels in various office space types. The measurement is a combination of external noise intrusion and noise from continuous internal noise sources such as building services and mechanical plant. The measurements should not include internally generated noise from occupational noise sources.
- 5.4.9 Internal noise levels should be measured in terms of LAeq,T where T refers to a normal working day e.g. 8hrs (0900-1700hrs).
- 5.4.10 The internal ambient noise level (IANL) design ranges outlined in BS 8233:2014 are outlined in Table 5.4 below.

Room Type	Criteria dB LAeq, T
Executive Office	35-40
Corridor / Circulation Space	45-55

Table 5.4: IANL Criteria BS8233:2014 Noise Reduction in Buildings

- 5.4.11 Noise from building services should be designed and controlled to meet the noise criteria outlined in Table 5.5 below.

Room Type	Criteria dB LAeq, T
Cellular Offices	NR35
Speculative Offices	NR38
Open Plan Offices	NR40
Entrance Lobbies	NR40
Circulation Spaces	NR40
Toilets	NR45

Table 5.5: Building Services Noise Criteria BCO Guide

- 5.4.12 Maximum noise levels from external events should also be controlled to ≤55dB LAMax in open plan/speculative offices or ≤50dB LAMax in cellular offices.

6. TECHNICAL CONSTRAINTS & MITIGATION

6.1 Constraints

6.1.1 Common noise considerations that present themselves with such a scheme would include:

- » Fixed plant and services associated with commercial/residential areas of the development
- » Provision of car parking or new traffic routes through the site, which must be modelled to establish potential new road traffic noise impacts, as these will not be accounted for in the baseline assessment.
- » If an energy centre, or localised power generation facility is afforded to the site this may be a source of noise egress.
- » The existing water/sewage treatment works may be a source of noise egress which should be assessed.

6.1.2 Generally existing water treatment works and new energy provision installations can be assessed in accordance with BS4142:2014 provided suitable noise data can be captured, either via manufacturers data for new installations, or via thorough site assessment in the case of existing installations.

6.2 Mitigation Considerations

6.2.1 Construction Phase

- Implementation of a construction noise management plan, including implementation of site hoardings, and consideration for the type of construction plant, phasing and activity periods (day/night) for construction implemented.
- Potential application for a Section 61 construction noise permit, to avoid or mitigate risk of noise nuisance site operations cessation notices.

6.2.2 Operational Phase

- Implementation of careful design to new mechanical plant, services and energy provision to ensure compliance with suitable design criteria and Local Policy.
- Capture of noise levels from existing water treatment/sewage treatment installation to ensure suitable control of noise ingress into surrounding new development.
- Mitigation measures including noise barriers and earth bunds (topography dependant).
- Site massing can also provide effective noise barrier effects, for example when parking bays are orientated between large commercial buildings, the buildings will act as physical screens without the need for additional barrier provision, thereby protecting residential development inherently.
- On the basis of the receptor sensitivities identified it may be prudent to consider orientating the rear of parking bays away from the most sensitive residential receptors (predominantly existing residential development to the north, south and east). Using the proposed structures as physical screens as discussed above (subject to noise survey assessment findings)

7. MASTERPLAN ACOUSTIC COMMENTARY

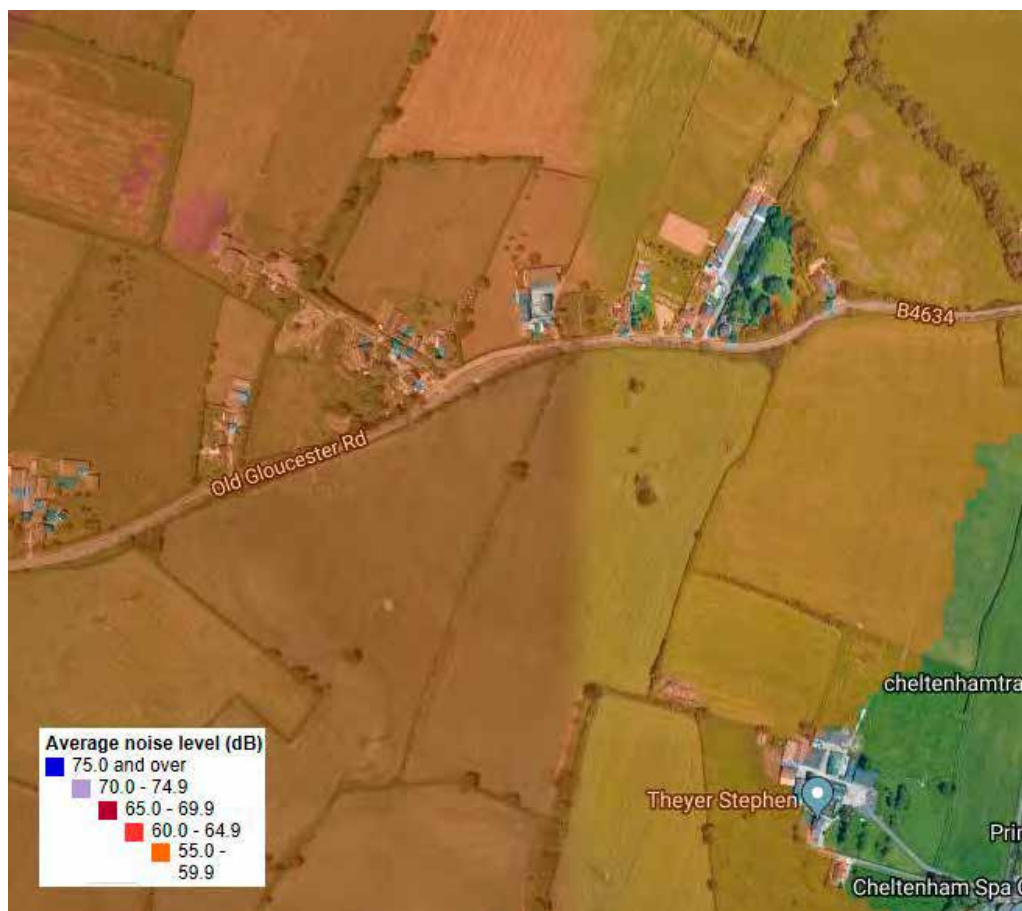
7.1.1 The current masterplan is reproduced below for comment.

Figure 7.1: Initial Masterplan



- 7.1.2 The site comprises multiple uses, there are already separate transport links proposed for commercial and residential accesses which is considered appropriate to mitigate commercial traffic noise ingress into residential areas.
- 7.1.3 Residential areas are already well spaced from the existing sewage/water treatment works, this will aid in mitigating noise impact from this source.
- 7.1.4 It is noted that communal external sports facilities will have incident noise levels due to the M5 of circa 55-60dB LAeq, T landscaping or bunding may need to be considered to reduce external noise levels depending on the findings of a detailed noise assessment.
- 7.1.5 External residential gardens or external amenity spaces may also require careful consideration on the same basis. Localised garden fencing and screening provided by surrounding structures will likely reduce noise levels in the immediate vicinity of residential units.
- 7.1.6 The proposed primary school is broadly located on the boundary of noise levels currently expected to be between 55-60 and 60-65 dB externally. It is considered the school site will be shielded to some extent by surrounding buildings and may still be suitable for natural ventilation. At present however, it is considered either hybrid natural or mechanical ventilation may need to be considered.
- 7.1.7 This will need to be verified by detailed assessment of existing noise levels. The excerpt below indicates this region of the site from existing noise maps:

Figure 7.2: School Site-Daytime LAeq, 16-hour daytime DEFRA Noise Map



DUE DILIGENCE

8. ADDITIONAL CONSIDERATIONS

8.1 Air Traffic

- 8.1.1 The site is not currently considered to have significant incident air traffic noise; however, this will be captured within baseline surveys if present, the significance can then be established and incorporated into site design needs.

8.2 Rail Traffic

- 8.2.1 Rail traffic is not expected to significantly impact the site, as rail links are not in close proximity to the proposed site. Figure 8.1 below provides DEFRA daytime noise maps of the local rail network for the wider site locale for information and context purposes:

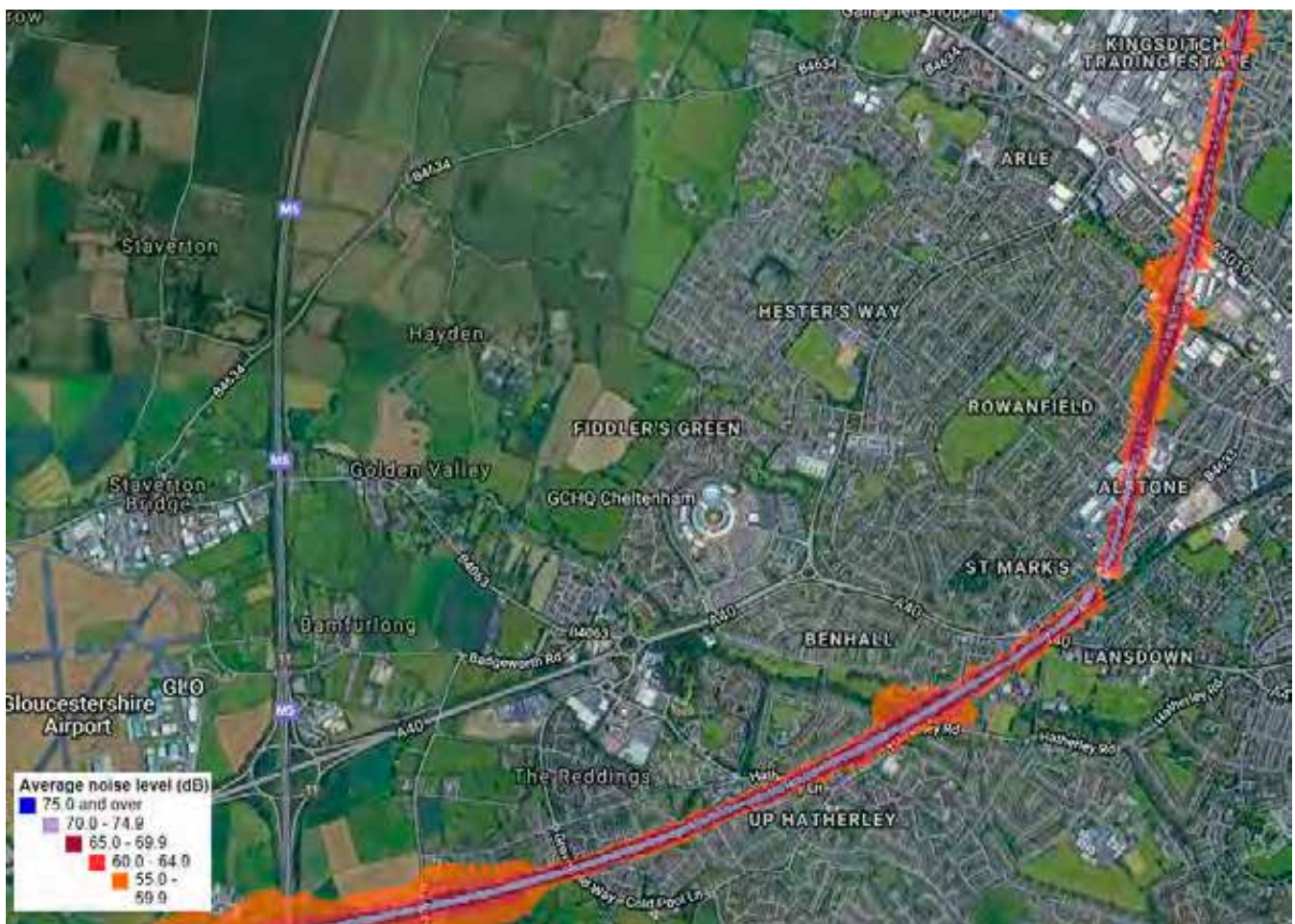


Figure 8.1 Local Rail Network Daytime LAeq, T 16 hour DEFRA noise mapping

8.3 Noise Impact from Commercial on Residential

- 8.3.1 Road traffic modelling will be needed to establish and clarify potential commercial traffic movements which may enter residential areas to the north of the site. There is potential that if this road link is used as a thoroughfare by HVGs this will need to further assessment.

9. PROJECT PROGRESSION ACOUSTIC CONSULTANCY RECOMMENDATIONS

9.1.1 It would be appropriate to undertake the following works with a view to achieving planning permission.

9.2 Site Surveying

9.2.1 Site survey assessment of existing noise sources should include:

- » Road traffic from key roads (A40, M5 and surrounding residential roads).
- » Noise impact assessment of the water/sewage treatment works to establish noise impacts on proposed development.

9.3 Noise Modelling

- » Assessment of new roads through the development to establish potential noise impacts resulting.
- » Modelling of the findings from the noise impact assessment of the sewage treatment works on the surrounding development.
- » Modelling of existing and road traffic noise sources impacting on the development and the surrounding existing residential areas.

9.4 Masterplan Development

- » Iterative development of the masterplan to mitigate potential noise impacts as they emerge/are established.

9.5 Design Development and Reporting

- » Production of a noise planning report to establish acoustic design parameters for key areas of the development (residential, commercial and education).
- » If required upon scoping with the Local Authority production of an EIA/ES Chapter to establish noise impact of the development on its surroundings.

10. SUMMARY

- 10.1.1 Available relevant acoustics, noise and vibration information within the public domain has been reviewed.
- 10.1.2 Comments on the potential noise impacts of the development have been reviewed and summarised.
- 10.1.3 The most likely statutory bodies, authorities and agencies that will require future stakeholder engagement on noise and vibration associated with the proposed development have been discussed.
- 10.1.4 Engineering/technical constraints which could impact on or would influence the development of the site relating primarily to noise have been summarised.
- 10.1.5 Outline mitigation and design solutions to be considered for implementation into the masterplan have been submitted.
- 10.1.6 An in-principle process has been provided to progress the project with consideration for noise and vibration.

DUE DILIGENCE

Project name	Cheltenham Cyber Park		
Design note title	Utilities Due Diligence Report		
Document reference	CCP-HYD-XX-XX-RP-Y-3000		
Author	Linzie Brown		
Revision	P02		
Date	23 October 2019	Approved	✓

EXECUTIVE SUMMARY

Upon review of the existing utilities networks and infrastructure within and surrounding the site, the following has been identified which will require consideration and assessment throughout the design stages.

The 2 x 132kV transmission lines, which have been incorporated into the masterplan, should continue to be considered within the designs and the clearance distances adhered to.

There is a Severn Trent Water 21" trunk main running through the south of the site, which has been incorporated into the masterplan design with a no-build easement strip. The distances of the easement from the centre of the pipe are to be determined by STW, however it will be a minimum of 6m either side of pipe.

A number of HV (11kV) overhead lines run through the site which will require diverting, either to more suitable routes or underground. There are also a number of existing pole-mounted substations that will require relocating, or grounding and re-purposing. 2 x buried HV cables run through the centre of the site which will require diverting.

Services will need to be diverted at the locations of both new entrances as the changes to the highways will impact any buried services that currently run in these carriageways. Old Gloucester Road junction is expected to impact LV cables, a water main, Openreach cables and fibre ducts belonging to Gigaclear and Zayo. Telstar Way Junction is expected to impact LV cables, Openreach cables and fibre ducts belonging to Instalcom, and may potentially impact a water main and MP gas mains.

The presence of utility infrastructure within and surrounding the site has confirmed that there will not be a constraint with regards to connecting the new development to the local networks.

The site is in close proximity to Cheltenham Primary Substation, which has been established to have capacity for electricity exporting, if required.

1. TERMS OF REFERENCE & OBJECTIVES

Hydrock Consultants has been appointed by Cheltenham Borough Council to provide Masterplanning stage advisory services in relation to providing new utility infrastructure to the proposed development in Cheltenham.

Hydrock were tasked to investigate whether the existing nearby utility infrastructure could support the new residential development as described below. This document is provided to give an overview of existing utility services, provision for new connections and establish any underlying requirements for diversionary works.

2. SITE INFORMATION

2.1 Site Location:

The full address and Ordnance Survey Grid Reference are given in Table 1 below.

Table 1 - Site referencing information

Site referencing information	
Site address	Site grid reference
Old Gloucester Road, West Cheltenham, Cheltenham, GL51 0XP	X: 391126 Y:223023



Figure 1 – Site location plan with redline boundary

2.2 Proposed Development:

The scheme proposes to build a mixed-use commercial-led development comprising a new cyber park and residential area with associated highways infrastructure and green space.

Access into the site will be provided via 2 new entrances on Old Gloucester Road (north of site) and Telstar Way (south of site).

The proposed site layout is shown in Figure 2 below.



Figure 2 - Cheltenham Cyber Park Masterplan

3. EXISTING SERVICES

This Utilities Statement is based upon utility information that has been provided by the respective utility providers in relation to the services within the vicinity of the development site. Hydrock has taken all reasonable steps, within the available timescales, to obtain the information from the respective utility companies. The information received has been summarised within this report. In the event that the information is relied upon and is subsequently found to be incorrect, Hydrock Consultants Ltd accepts no responsibility for any direct and/or consequential loss that may occur as a result.

The utility services that exist either within the site or its immediate surrounds are detailed below.

3.1 Gas – Wales and West Utilities

Wales and West Utilities (WWU) are the incumbent gas transporter for this service area.

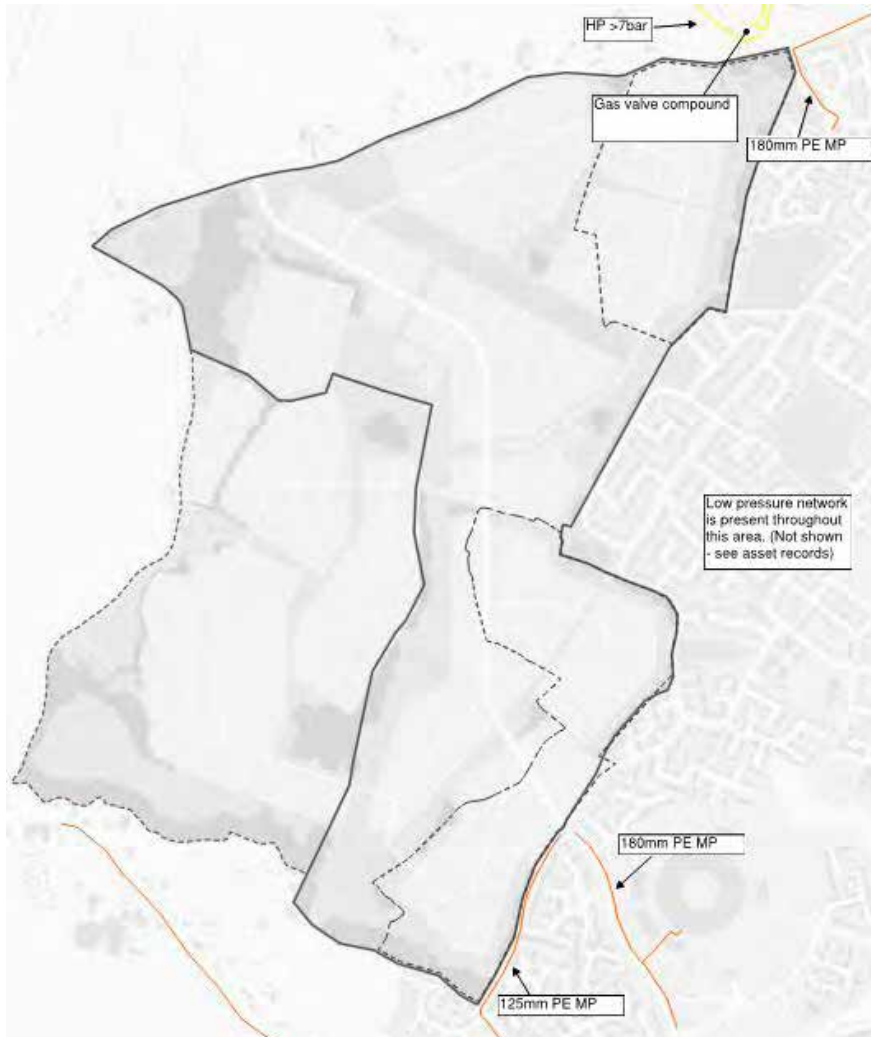


Figure 3 - Existing Wales and West Utilities HP and MP gas apparatus



Recommended Minimum Depths	
Footway/Verge	Carriageway
600mm footway	750mm
750mm verge	

3.1.1 Existing infrastructure

Records received from WWU indicate that there is no gas infrastructure located within the site boundary. On the outside of the south-east boundary of the site, a 125mm diameter polyethylene (PE) medium pressure (MP) main is shown to run in Fiddler's Green Lane, terminating at a capped end at the Telstar Way junction. A 180mm PE MP main runs in the footpath of Telstar Way also terminating at a capped end on the east side of the roundabout.

Outside the north-east boundary, a 180mm diameter MP main runs along old Gloucester Road and down Pilgrove Way.

There is also shown a gas valve compound on the north side of Old Gloucester Road connecting a number of high pressure (HP) mains that extend northwards away from the site.

A low pressure (LP) network runs throughout the residential area to the east of the site. No apparatus is shown to exist to the west.

3.1.2 Constraints

Due to the location of WWU assets outside of the site boundary, it is expected that diversionary work will not be required. However, there is a potential conflict with the proposed new entrance on the southern side. Any significant highways alterations and/or ground level changes may affect the 2 MP gas mains that terminate at the existing roundabout and minor diversions may be required to accommodate the new layout.

3.1.3 New connections

In terms of establishing a point of connection to the site, the size and locality of existing gas apparatus will not cause a constraint.

It is anticipated that in order to supply the site with gas, new MP mains will need to be installed from the existing infrastructure to the north and/or south of the site. It is expected that the new mains would be installed along the spine road of the development, creating a central main to serve the new network and supplies.

With regards to capacity, an enquiry will need to be raised with Wales and West Utilities to establish whether there is sufficient capacity in the existing local network to support the new load, and what, if any, reinforcements may be required.

3.2 Power – Western Power Distribution

Western Power Distribution (WPD) are the incumbent distribution network operator for this service area.

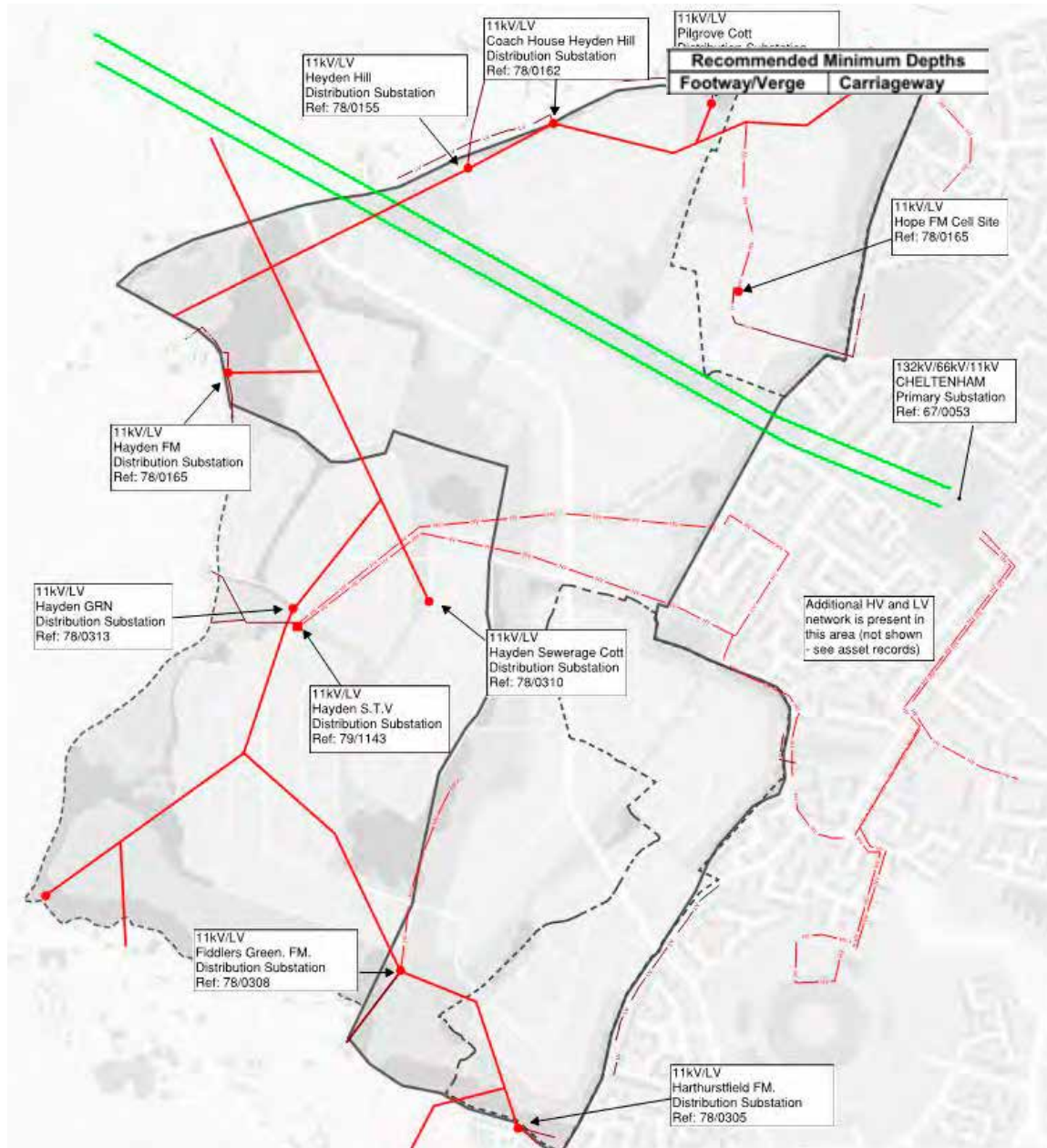


Figure 4 - Existing WPD electricity apparatus



3.2.1 Existing Infrastructure

Records received from WPD show 2 parallel 132kV electricity transmission lines and associated pylons running in a south-easterly direction through the northern half of the site, terminating at WPD's Primary Substation, Cheltenham (ref: 67/0053). Cheltenham Primary is located on Hester's Way Road, approximately 350m straight line distance from the site.

A number of high voltage (HV) 11kV overhead lines and associated poles are shown to run through the site and within the boundary, predominantly near the north, west and southern edges of the site.

With regards to buried apparatus, 2 x HV 11kV underground cables run west to east through the central area of the site and a buried line also runs from the overhead network in the north down to reach Hope Farm, providing a service to the existing buildings associated with the farm.

Other WPD infrastructure residing within the site boundary includes a number of 11kV/LV secondary substations, one of which is a ground-mounted substation with the rest are pole-mounted transformers (PMT). Figure 4 above indicates their locations and substation references.

A low voltage network also exists within the residential area bounding the east of the site.

3.2.2 Constraints

The masterplan currently includes a strip along the route of the 132kV transmission lines within which there are no buildings, which is a design element that should be retained throughout the development of the site layout.

Safety clearances must be maintained from buildings constructed under or adjacent to overhead lines as well as other structures such as street lighting, objects on which a person may stand and new roads and new ground levels (where these will be altered by civil engineering operations) and where planting takes place.

The following tables have been taken from the Energy Networks Association's Engineering Directorate: Overhead Line Clearances, which stipulates the clearance distances required from grounds, roads, objects, buildings and structures.

The clearances below shall not be infringed at the specified maximum with the conducting hanging vertical in still air or deflected at any angle up to 45° from the vertical.

Table 2 - Clearances to Ground and Roads

Item	Description of Clearance	Nominal System Voltage (kV)				
		Minimum Clearance (m)				
		≤ 33	66	132	275	400
6.1.1	Line conductor at any point not over road. (Note 1)	5.2	6.0	6.7	7.0	7.6
6.1.2	Line conductor to road surface other than as specified in 6.1.3, 6.1.4, and 6.1.5. (Note 2)	5.8	6.0	6.7	7.4	8.1
6.1.3	Line conductor to road surface of designated '6.1m high load' routes. (Note 3)	6.9	7.1	7.5	8.5	9.2
6.1.4	Line conductor to motorway or other road surface where 'Skycradle' can be used. (Note 4 & 6)	8.2	8.4	8.8	9.8	10.5
6.1.5	Line conductor to motorway road surface where scaffolding is to be used on:					
	(i) Normal 3 lane motorways. (ii) Elevated 2 lane motorways (Note 5 & 6)	14.0 11.0	14.2 11.2	14.6 11.6	15.6 12.6	16.3 13.3
6.1.6	Bare live metalwork, e.g. transformer terminals, jumper connections, etc. (Note 7)	4.3	4.3	Controlled Zone Safety Rules Apply		

Table 3 - Clearances to Objects

Item	Description of Clearance	Nominal System Voltage (kV)				
		Minimum Clearance (m)				
		≤ 33	66	132	275	400
6.2.1	Line conductor to any object which is normally accessible (including permanently mounted ladders and access platforms) or to any surface of a building. (Note 1 and Fig. 1)	3.0	3.2	3.6	4.6	5.3
6.2.2	Line conductor to any object to which access is not required AND on which a person cannot stand or lean a ladder. (Note 2)	0.8	1.0	1.4	2.4	3.1

Table 4 - Clearances to Objects continued

Item	Description of Clearance	Nominal System Voltage (kV)				
		Minimum Clearance (m)				
		≤ 33	66	132	275	400
6.2.3	Line conductors to that part of a tree under / adjacent to line and:					
	(i) Unable to support ladder / climber.	0.8	1.0	1.4	2.4	3.1
	(ii) Capable of supporting ladder / climber.	3.0	3.2	3.6	4.6	5.3
	(iii) Trees falling towards line with conductors hanging vertically only. (Note 3 and Fig. 2(a))	0.8	1.0	1.4	2.4	3.1
6.2.4	Line conductors to trees in Orchards and Hop Gardens. (Note 4 and Fig.2(b))	3.0	3.2	3.6	4.6	5.3
6.2.5	Line conductors to irrigators, slurry guns and high pressure hoses (Note 5)	30.0	30.0	30.0	30.0	30.0
6.2.6	Line conductor to street lighting standards with:					
	(i) Standard in normal upright position.	1.7	1.9	2.3	3.3	4.0
	(ii) Standard falling towards line with conductor hanging vertically only.	1.7	1.9	2.3	3.3	4.0
	(iii) Standard falling towards line. (Note 6, Fig. 3 and 4)	0.4	0.7	0.8	1.4	1.9

Table 5 - Ground clearances

Location	Minimum Clearance (m)
Along the line of hedgerows, fences and boundary walls etc.	4.0
Domestic driveways with an access width of 2.5 m or less which is defined by gateposts, hedges or other fixed features.	4.3
Between buildings where there is no vehicular access.	3.5

Table 6 - Clearance to Buildings and Structures

Location	Minimum Clearance (m)
Vertical clearance to any surface or structure that is accessible without access equipment (see Fig. 5).	3.0
Horizontal distance to any surface of a building or structure which is accessible without access equipment (see Fig. 5).	1.0
Clearance to parts of a building or structure not normally accessible (see Fig. 5). See note 1.	0.5
Clearance to free-standing apparatus such as street lighting columns, traffic signs, British Telecom poles or columns (see Fig. 5).	0.3

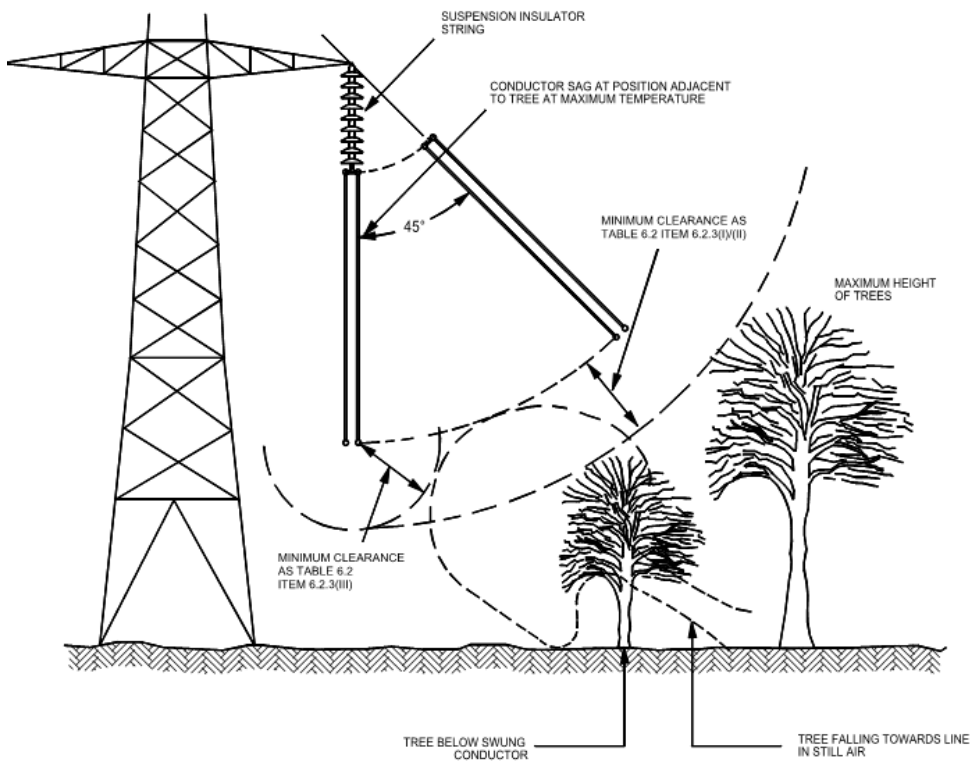


Figure 5 - Clearance to trees

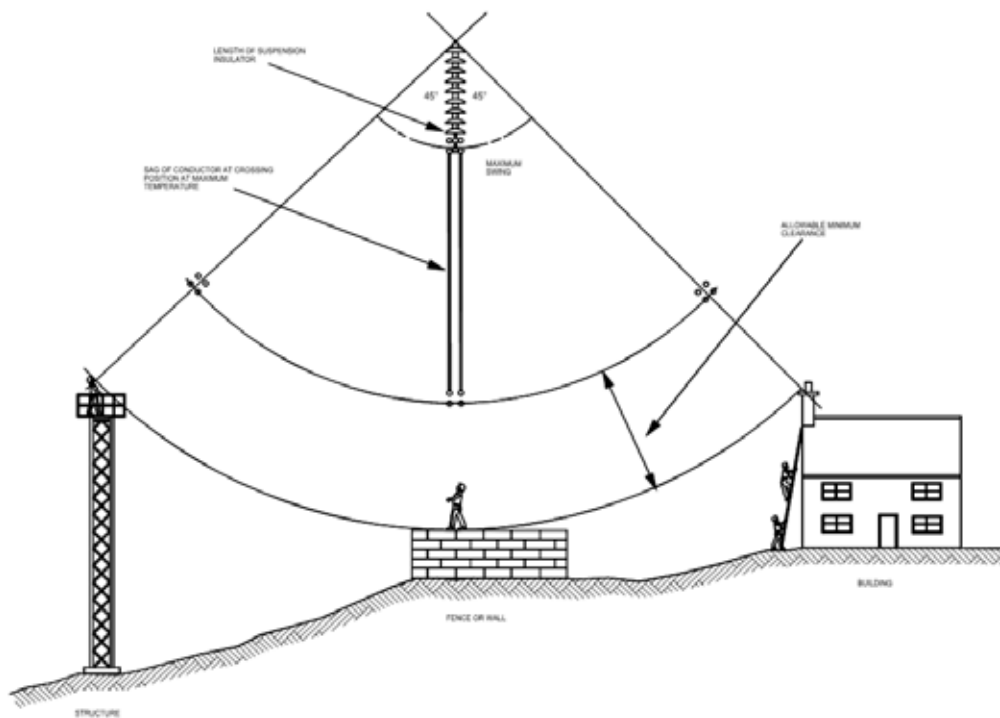


Figure 6- Clearance to objects (on which a person can stand)

In addition to the 132kV transmission lines, the 11kV overhead and buried cables also cause a constraint with the masterplan, however, this network can be diverted to accommodate the site layout, if required.

It is anticipated that the buried cables that run through the centre of the site will need to be diverted via the new road network, so that they do not conflict with the proposed buildings.

It should be noted that the asset records are only indicative of the location of the buried apparatus and therefore, it is recommended that at the next stage of design a survey is undertaken to establish the accurate position in order to inform the designs.

The overhead 11kV network in the north, east and south of the site will also require diversionary works to accommodate the current layout. It is anticipated that the overhead lines and poles that currently run over the areas of proposed buildings will require dismantling and diverting underground to run through the proposed new road network, or around the edge of the site. It is also anticipated that a couple of the substations will require relocating, grounding and/or re-purposing.

An application will be made to WPD at the next stage of design to assess the necessity for diversions, potential diversion routes and the likely cost implications for the works.

3.2.3 *New connections*

In terms of establishing a point of connection to the site, the size (voltage) and locality of existing electricity apparatus will not cause a constraint.

It is anticipated that in order to supply the site with electricity, new HV mains cables will need to be installed from the existing infrastructure around the site or from the Cheltenham Primary Substation. It is expected that the new mains would be installed along the spine road of the development, creating a central main to serve the new network and supplies.

A number of secondary substations will also be required throughout the site and will need space provision of approximately 5m x 5m.

With regards to capacity, a desktop investigation has confirmed that Cheltenham Primary Substation, which is a 132kV/66kV/11kV transformer, has a total capacity of 65MVA, of which circa 41MVA peak load is currently being used, leaving a spare capacity of 24MVA. A load assessment has not yet been completed for the development, however, it is anticipated to require less than 24MVA, and therefore, it can be assumed that there will be sufficient capacity at the Primary Substation to support the development. Reinforcements may be required however to the local HV infrastructure, such as additional cabling and circuits.

Upon completion of a load assessment, an enquiry will need to be raised with WPD to confirm whether there is sufficient capacity in the existing local network to support the new load, and what, if any, reinforcements may be required.

Figure 7 below indicates the location of Cheltenham Primary Substation and the network area that it supplies.



Figure 7 - Cheltenham Primary Substation network area

3.2.4 Opportunities

A desktop study was undertaken to establish whether there is any opportunity for exporting power to the Cheltenham Primary Substation. The investigation confirmed that the primary has an incoming capacity of 32.5MVA, with only 1.2MVA connected currently.

It also confirmed that there are no fault level issues, meaning that the risks associated with overheating and faults when exporting electricity to this substation are low.

This concludes that there is a good opportunity for export to Cheltenham Primary. The opportunity will be explored further within Hydrock's Smart Energy assessment at the next stage of design.

3.3 Water – Severn Trent Water

Severn Trent Water (STW) are the incumbent water board for this service area.

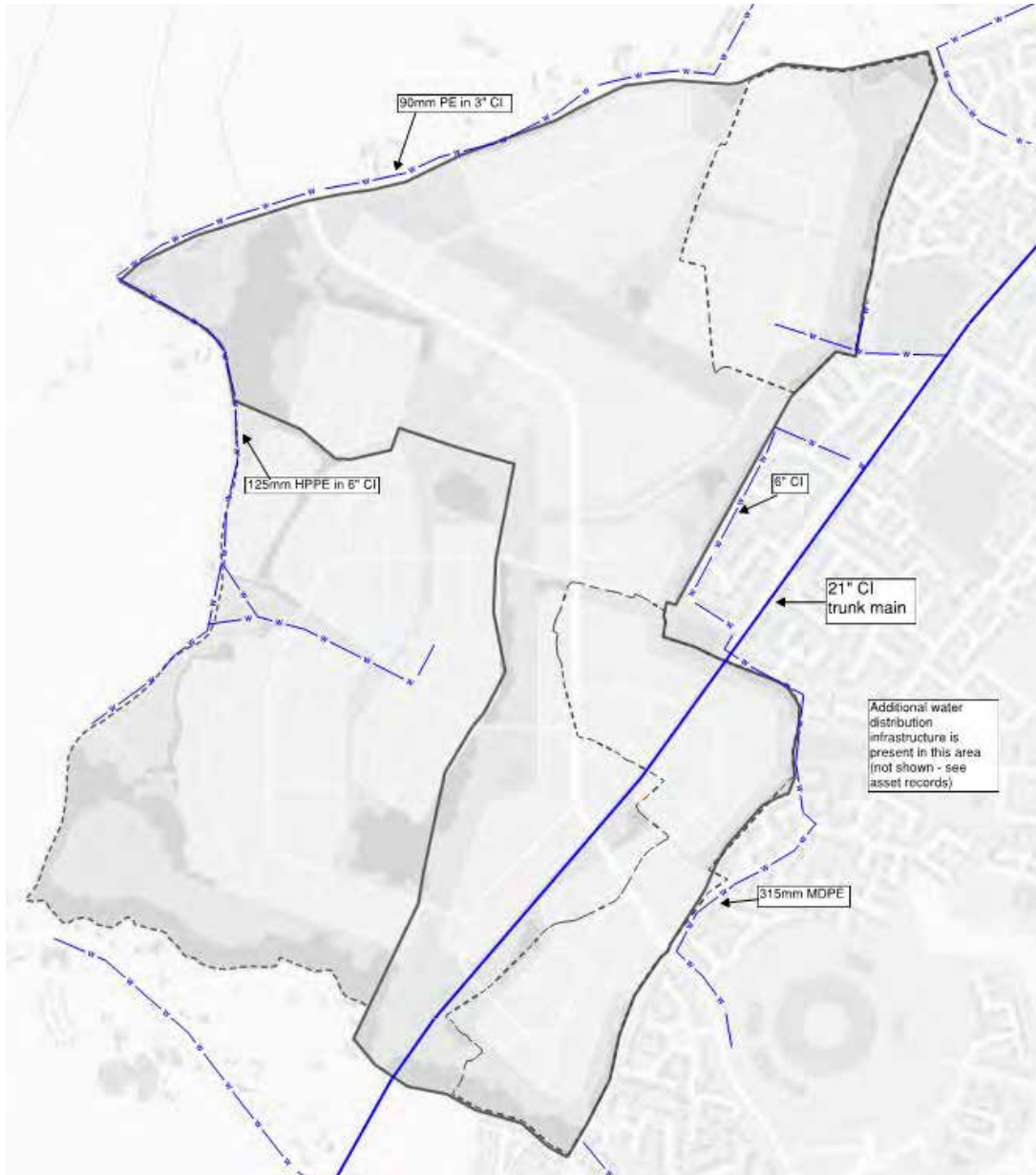


Figure 8 - Existing Severn Trent Water apparatus



Recommended Minimum Depths	
Footway/Verge	Carriageway
600 – 750mm	600 – 750mm

3.3.1 Existing Infrastructure

Records received from Severn Trent Water show a 21" cast iron (CI) trunk main running through a large portion of land in the southern section of the site.

A 4" CI main providing a service and hydrant to Hope Farm exists within the boundary, as well as a distribution network entering the site from the west to supply the Hayden Sewage Works. The remainder of the distribution

network bounds the north and east edges and runs throughout the residential areas that surround the site, but do not encroach into the boundary.

The key infrastructure around the site includes a 90mm polyethylene in a 3" CI main in Old Gloucester Road to the north, a 6" CI main in Henley Road to the east and a 315mm medium-density PE (MDPE) pipe around the south east boundary of the site, running in Telstar Way.

3.3.2 *Constraints*

The 21" trunk main has been considered within the masterplan with a strip of green space over the location of the main and therefore is not anticipated to pose a constraint.

A trunk main is a strategic pipeline that carries water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. It is also used for transferring water in bulk to smaller water mains used for supplying individual customers.

Due to the strategic nature of such a main, a diversion is not always a viable option as the costs and works involved can be extensive. The preferred option from the water companies tends to be to stipulate a no-build easement strip within which there are no kinds of permanent structures or trees with large root structures. The easement distances can be specific to each main, however for a main larger than 12" the standard minimum is 6m either side of the pipe. It is expected that, due to the size of the main in this area (21"), a larger easement strip could be required. An enquiry has been made with STW to determine what the easement distance is likely to be.

It is recommended that the accurate position of the main is confirmed at an early stage with an onsite investigations (such as a GPR survey) so that it may inform more developed designs.

Any existing connections within the site will require disconnecting prior demolition.

3.3.3 *New connections*

In terms of establishing a point of connection to the site, the size and locality of existing potable water apparatus will not cause a constraint.

It is anticipated that in order to supply the site with clean water, new distribution mains will need to be installed from the existing infrastructure to the north and/or south of the site. It is expected that the new mains would be installed along the spine road of the development, creating a central main to serve the new distribution network and supplies.

With regards to capacity, an enquiry will need to be raised with STW to establish whether there is sufficient capacity in the existing local network to support the new load, and what, if any, reinforcements may be required.

3.4 Telecommunications – Openreach (BT)

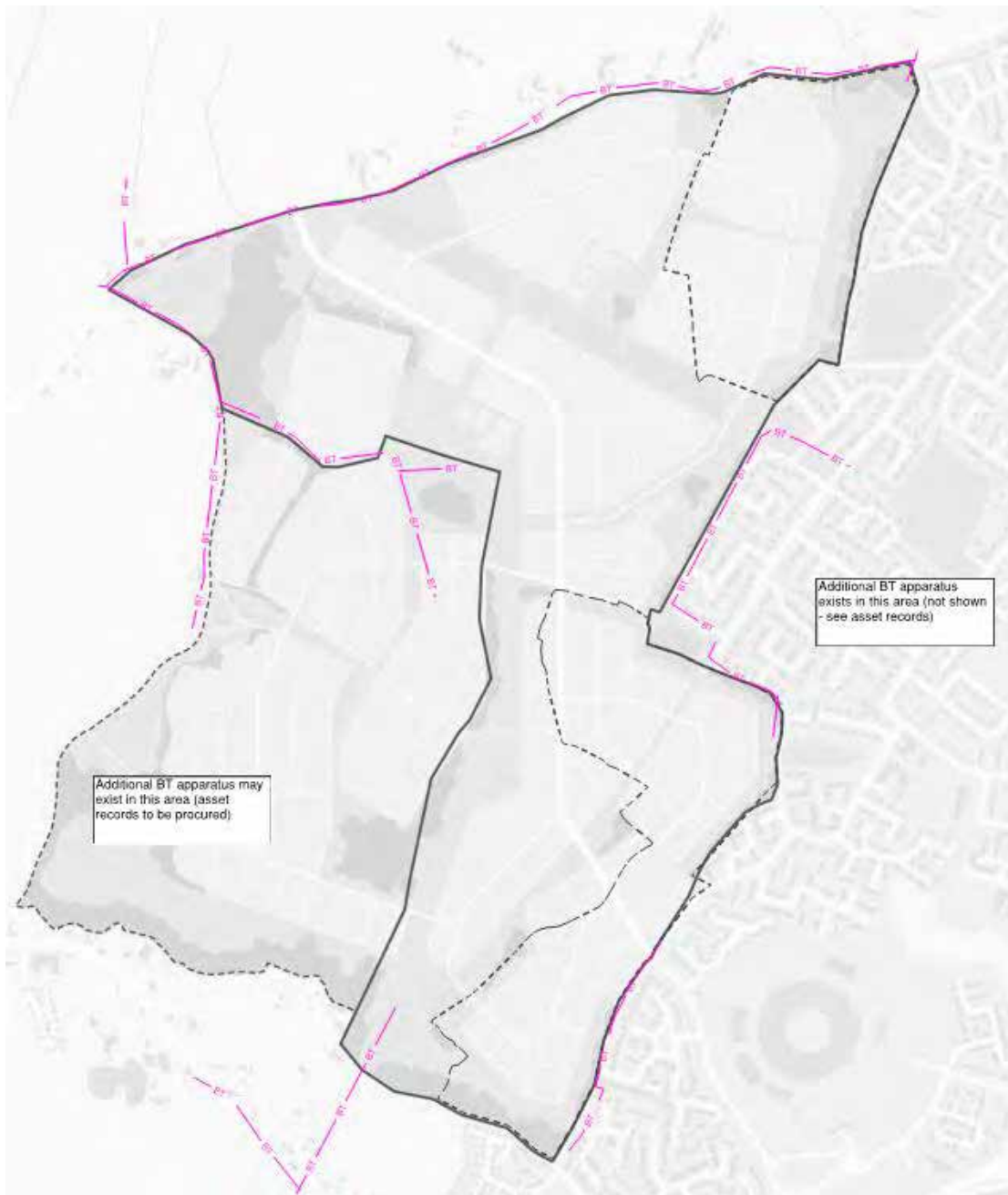


Figure 9 - Existing Openreach (BT) apparatus

Recommended Minimum Depths	
Footway/Verge	Carriageway
250 – 350mm	450 - 600mm

3.4.1 Existing Infrastructure

Openreach provides the telecommunications infrastructure in the UK. British Telecoms (BT) provide the telecommunication services.

Records received from Openreach show existing buried apparatus and associated chambers running in the nearside verge of Old Gloucester Road, as well as throughout the residential area that bounds the site to the east. A further buried and overhead network exists to the west of the site along Hayden Lane which continues southwards to provide a service to Hayden Sewage Works.

An "inferred" network is shown to run in the nearside verge of Fiddler's Green Lane. Inferred network typically is recently laid apparatus that has not yet been checked/confirmed by an Openreach engineer and therefore shows as a purple line on the asset records. Therefore, the location and route is only assumed.

With regards to existing connections on site, an overhead line is shown to extend into the site from Pheasant Lane at the south, terminating at a pole at the edge of the existing buildings north of Hatherley Brook. An overhead line also provides a connection inside the boundary to the buildings off Springback Road.

All existing connections will require disconnecting prior to any demolition.

3.4.2 Constraints

A couple of conflicts have been identified at the locations of the new site access roads where the BT apparatus runs in the verge and carriageway.

The typical depth of buried telecoms cables is 250mm-350mm when in a verge, however a 450mm level of cover should be retained when buried in a carriageway. Due to the change in highway layout, it is anticipated that the telecoms apparatus in Old Gloucester Road and Fiddler's Green Lane will require diversions beneath or into the new bellmouths.

Openreach charge a diversion application fee (specific to each site) to conduct a site survey and subsequently produce a specification of works and a detailed estimate. An application will be made at the next stage to understand costs and works required for the diversions.

It is expected that the overhead apparatus connecting any existing buildings will be dismantled and removed as part of the disconnection process.

3.4.3 New Connections

In terms of establishing a point of connection, the locality of existing Openreach apparatus will not cause a constraint. It is anticipated that a new Openreach network will be established from existing buried infrastructure that surrounds the site.

3.5 Data/Fibre

3.5.1 Existing Infrastructure

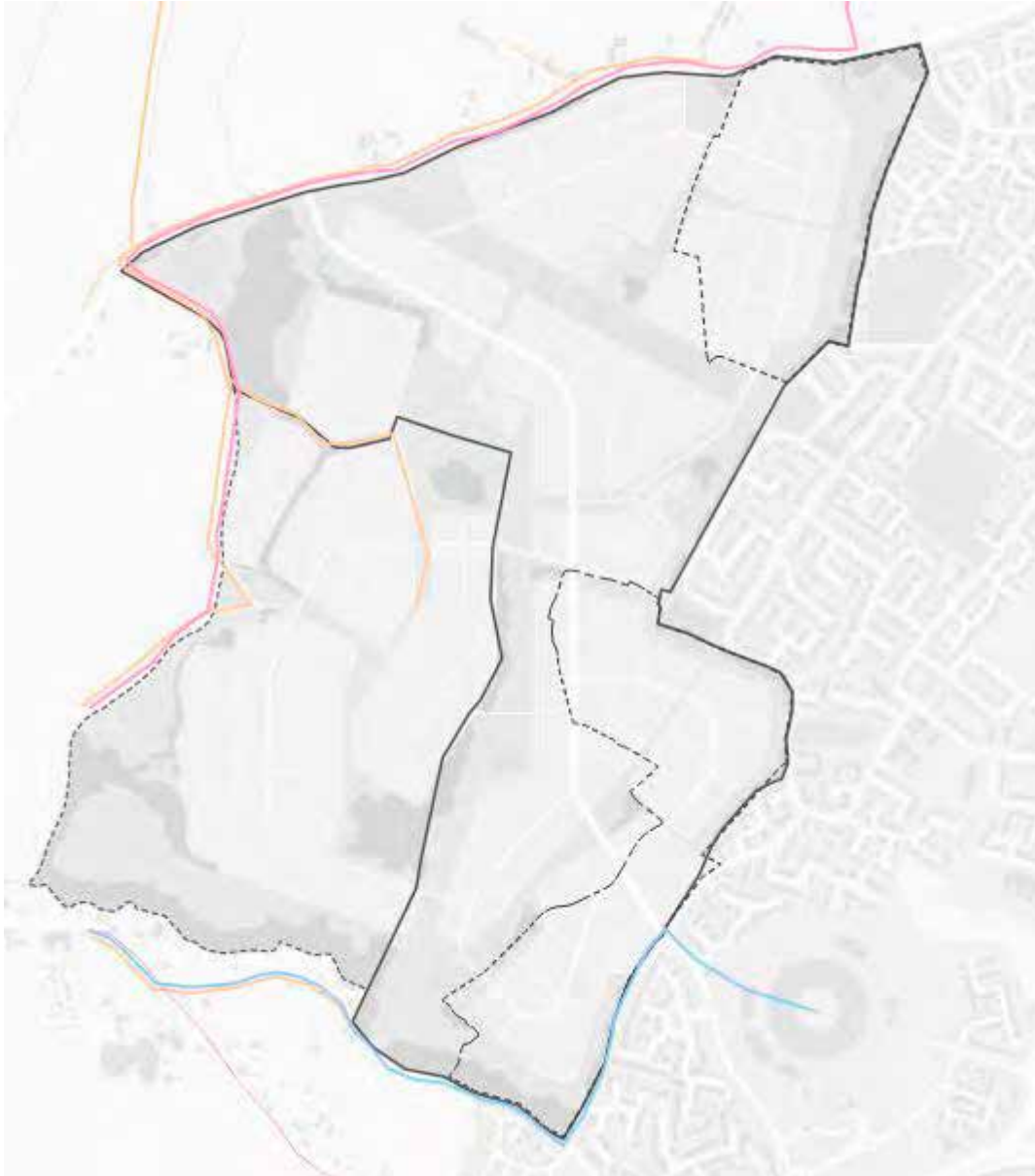


Figure 10 - Existing fibre apparatus



3.5.2 Existing Infrastructure

Records received from both Zayo and Gigaclear show existing buried fibre apparatus running in Old Gloucester Road along the northern boundary of the site and Hayden Lane to the northwest.

Records received from Instalcom show a fibre network running along Telstar Way, and down Fiddler's Green Lane along the site's south-east boundary. It then continues along Pheasant Lane at the site's southern boundary.

3.5.3 Constraints

Conflicts have been identified at the locations of the new site access entrances at Old Gloucester Road Junction and Telstar Way junction. Due to the change in highway layout, it is anticipated that the fibre apparatus at both locations will require diverting beneath or into the new bellmouths.

It is recommended that the accurate location depths of the fibre ducts are established at an early stage in order to inform designs and determine the extent of the diversionary works required. This can be done either with a GPR survey (for an indication of position/location) or trial holes (for confirmation of depths).

Applications to Gigaclear, Instalcom and Zayo will be made at the next stage to determine likely costs for the diversionary works.

3.6 Other Independent Utility Companies

Hydrock has undertaken a utility enquiry search using the Linesearch.org website. The results of the search conclude that the following companies do not have plant and equipment in 'zone of interest.'



Figure 12 - LSBUD search area 1



Figure 11 - LSBUD search area 2

List of not affected LSBUD members		
AWE Pipeline	Balfour Beatty Investments Limited	BOC Limited (A Member of the Linde Group)
BP Exploration Operating Company Limited	BPA	Carrington Gas Pipeline
CATS Pipeline c/o Wood Group PSN	Cemex	Centrica Storage Ltd
CLH Pipeline System Ltd	Concept Solutions People Ltd	ConocoPhillips (UK) Ltd
DIO (MOD Abandoned Pipelines)	Drax Group	E.ON UK CHP Limited
EirGrid	Electricity North West Limited	ENI & Himor c/o Penspen Ltd
EnQuest NNS Limited	EP Langage Limited	ESP Utilities Group
ESSAR	Esso Petroleum Company Limited	Fulcrum Pipelines Limited
Gamma	Gateshead Energy Company	Gtt
Hafren Dyfrdwy	Heathrow Airport LTD	Humbly Grove Energy
IGas Energy	INEOS FPS Pipelines	INEOS Manufacturing (Scotland and TSEP)
INOVYN Enterprises Limited	Intergen (Coryton Energy or Spalding Energy)	Mainline Pipelines Limited
Manchester Jetline Limited	Manx Cable Company	Marchwood Power Ltd (Gas Pipeline)
Melbourn Solar Limited	Murphy Utility Assets	National Grid Gas (Above 7 bar), National Grid Gas Distribution Limited (Above 2 bar) and National Grid Electricity Transmission
Northumbrian Water Group	NPower CHP Pipelines	Oikos Storage Limited
Ørsted	Perenco UK Limited (Purbeck Southampton Pipeline)	Perenco UK Limited (Purbeck Southampton Pipeline)
Petroineos	Phillips 66	Premier Transmission Ltd (SNIP)
Prysmian Cables & Systems Ltd (c/o Western Link)	Redundant Pipelines - LPDA	RWE - Great Yarmouth Pipeline (Bacton to Great Yarmouth Power Station)
RWEnpower (Little Barford and South Haven)	SABIC UK Petrochemicals	Scottish Power Generation
Seabank Power Ltd	Severn Trent (Chester area only)	SGN
Shell (St Fergus to Mossmorran)	Shell Pipelines	SSE (Peterhead Power Station)
Tata Communications (c/o JSM Construction Ltd)	Total (Colnbrook & Colwick Pipelines)	Total Finaline Pipelines
Transmission Capital	UK Power Networks	Uniper UK Ltd
Vattenfall	Veolia ES SELCHP Limited	Westminster City Council

The following companies, not registered to Linesearch, were independently contacted by Hydrock and subsequently responded to confirm they have **no assets** in the zone of interest:

- CityFibre
- Energetics
- Engie
- KPN
- Sky Telecommunications Services
- SOTA
- Teliasonera
- Verizon
- Vodafone

The asset records of the following companies have been requested, however, at the time of reporting, no response had been received. It is therefore recommended that the potential presence of assets should be considered:

- Colt Technology Services
- Virgin Media

Please note that Hydrock Consulting is unable to guarantee the accuracy of information provided by others. This report is based on information available at the time.