Somerset Council

ARUP

Somerset Council

Wellington Waterways Feasibility Study - WWFS

Baseline Evidence Report

Reference: Final Issue Report

C01 | 22 December 2023

Job number 297303-00

Ove Arup & Partners Limited
63 St Thomas Street
Bristol
BS1 6JZ
United Kingdom
arup.com

Contents

Tables

Figures

Photographs

Appendices

Introduction and Context

1. Introduction and Context

1.1 Introduction

Arup has been commissioned by Somerset Council to undertake the Wellington Waterways Feasibility Study (WWFS), to propose a vision for reducing flood risk to key heritage assets of Tonedale (Tonedale Mill and Tone Works), and wider Wellington, alongside delivering wider benefits for nature and the community.

The study will be multi-disciplinary and will inform funding and investment decisions to deliver a broad range of benefits to contribute to the Somerset Levels and Moors Flood Action Plan (FAP) and other community objectives across the wider catchment area along the River Tone and its tributary, the Westford Stream.

Tonedale Mill and Tone Works are significant due to their associated historic water management infrastructure and their history as the headquarters and main production sites of a woollen mill and cloth finishing works, producing cloth from raw fleece.

The two interlinked mill complexes, Tonedale Mill and Tone Works, are located within 500 m of each other, on the north-west side of Wellington in Somerset. The factory mills were established around the year 1800 from existing earlier water-powered mills, with a constant water supply being essential throughout their period of operation. Surface water bodies flow into Tonedale Mill from the south (Westford Stream) and the west (River Tone) where the converge at Tone Works. The extensive and complex water management system secured a reliable flow of water from 'the basins' located upstream of Tonedale Mill in the face of seasonal fluctuations in stream level.

The buildings at both sites contain features associated with water management which extend into the wider landscape as a network of culverts, channels (leats), weirs, sluices, ponds and footbridges. In addition to this, natural watercourses were modified and adapted to serve the increasing requirements for water as power and for numerous factory processes.

There is no currently defined Red Line Boundary for the study as it is to encompass a range of assets, constraints and opportunities that may be feasible in the immediate areas around Tone Works and Tonedale Mill or in the wider catchment. However, disciplines have used expert judgement to define discipline specific areas of assessment to report baseline evidence from, anticipating where options may be developed.

1.2 Purpose of this report

This version of the technical report is to support the public consultation.

The purpose of this Baseline Evidence Report is to establish an understanding of the site and its complexities to support the development and appraisal of options to address flood risk and provide wider community benefits. The Baseline Evidence Report covers the key elements which require understanding to develop a vision for the study area, which includes:

- Placemaking and planning background for the study area;
- Flood risk and water environment (including nutrient neutrality constraints);
- Land use, topography and geology;
- Ecology and biodiversity;
- Climate change, carbon emissions and renewable energy potential;
- Historic environment; and
- Landscape of the study area.

This Baseline Evidence Report sets out the context for the Study to develop an options appraisal process suitable for achieving the 'Project Brief' and summarises key drivers of change for the further exploration of solutions in the next steps of the study. Key challenges or constraints are identified for the Wellington waterways, which will be agreed upon the community and key stakeholders, to allow the development of suitable options.

Planning and Placemaking

2. Planning and Placemaking Context

This Chapter of the Report identifies the local and national planning policies which will have to be considered during the development of the Study. Any options presented and taken forward will have regard to and be compliant with the identified policies, legislation and supporting guidance as identified below.

The holistic and forward-thinking nature of the Study means that whilst there will undoubtedly be conflicts between topics and/or receptors and what is needed to mitigate potential effects, the Study will prioritise a balance between all key features of the proposed Study area and wider local community.

2.1 The Local Plan

On the 1st April 2023, Somerset Council became the Local Planning Authority (LPA) for the whole of the Somerset administrative area, and includes the former LPAs of;

- Mendip District Council
- Sedgemoor District
- Somerset West and Taunton Council
- South Somerset District Council; and
- Somerset County Council

With the exception of Exmoor National Park area, Somerset Council is responsible for producing planning policy documents and guiding new development, and Somerset Council are currently in the process of producing their new Development Plan.

Given the early stages of the Somerset Council's Development Plan, as set out in Local Government (Structural Changes) (General) (Amendment) Regulations 2018, if a Local Authority is going through Local Government Reorganisation, existing development plans will remain in place for the areas set out in the plan. Therefore, the existing development plans of the former LPAs will remain for the relevant geographical areas of Somerset Council.

The following Local Plan documents which are of relevance to this Study include:

- Taunton Deane Core Strategy 2011 to 2028
- Taunton Deane Site Allocations and Development Management Plan 2028; and
- Taunton Deane Policies Map

2.1.1 Taunton Deane Core Strategy 2011 to 2028[1]

Adopted in 2012, the Taunton Deane Core Strategy sets out the vision for Taunton Deane and the strategic objectives, spatial strategies and policies for meeting that vision. The Strategy includes a number of policies for the control of development and to set the strategic framework across the Borough. The strategy also identifies the locations for growth and strategy site allocations for developments over five hectares. The Strategy's vision recognises the global challenge of Climate Change and its relevance to Taunton Dean, particularly in relation to flood risk. Therefore, the strategy sets out to help the Borough consider, mitigate and adapt to the effects of climate change whilst also maximising sustainability and the distinctive character of the area.

The strategy sets out a number of objectives to help achieve the vision, the following objectives which are of most relevance to the Study include;

[1] SCC - Public - SWT - Taunton Core Strategy 2011-2028.pdf - All Documents (sharepoint.com)

- Strategy Objective 1 (Climate Change); This objective sets the ambition for Taunton Deane to be a leader in addressing the causes and impacts of climate change and adapting to its effects
- Strategic Objective 2 (Economy); The right conditions and sufficient land in appropriate locations should be provided to promote the growth of the green knowledge economy and raise the overall quality of jobs.
- Strategy Objective 7 (Infrastructure); Development should contribute to infrastructure that is necessary and to mitigate impact on existing communities and the environment.
- Strategic Objective 8 (Environment): These objective states biodiversity should be maintain and enhanced, including the natural environment and man-made environment. The need to travel should be minimised and good design should be promoted with the use of materials that respect and enhance local distinctiveness.

The strategy also sets out a number of policies which are of relevance to the Study, the details of these policies are explained in more detail within

Policy context

. Detail of the policy boundaries can also be found within the Taunton Deane Policies Map.

2.1.2 Taunton Deane Adopted Site Allocations and Development Management Plan[2]

The Taunton Deane Adopted Site Allocations and Development Management Plan provides the detailed development management policies which guide decision-making on specific planning issues. The policies pertinent to the Study are listed below and can also be found in Appendix 1.

- Policy WEL1 Tonedale Mill
- Policy C1 Reserved Land for Educational Purposes
- Policy C2 Provision of recreational open space
- Policy ENV1 Protection of trees, woodland, orchards and hedgerows
- Policy ENV3 Special Landscape Features
- Policy ENV4 Archaeology
- Policy ENV5 Development in the vicinity of rovers and canals

Details of these policy boundaries can also be found within the Taunton Deane Policies Map.

2.2 Material Considerations

2.2.1 Districtwide Design Guide Supplementary Planning Document [3]

Adopted in 2021, the Districtwide Design Guide Supplementary Planning Document (SPD) provides guidance as to how to respond to adopted planning policy to ensure high quality design within the former Somerset West and Taunton authority area. This SPD sets out a sequence of considerations within the design appraisal and negotiations of development. The SPD highlights that the aim of design decision from the outset should be to reduce emissions, provide green infrastructure and respond to the context of the area, having consideration for biodiversity and microclimate. The SPD has been produced to guide developers and designers and should be considered by the local planning authority within their decision-making process.

[2] SCC - Public (sharepoint.com)

[3] SCC - Public - SWT - Districtwide Design Guide SPD .pdf - All Documents (sharepoint.com)

2.2.2 National Planning Policy Framework (2023)[4]

The National Planning Policy Framework outlines the Government's planning policies for England and how the policies should be applied. When producing development plans the National Planning Policy Framework (NPPF) is considered to be a material consideration and therefore should be taken into account in planning decisions. The NPPF is centred around the presumption in favour of sustainable development and therefore all plans should "promote a sustainable pattern of development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change and adapt to its effects" (paragraph 11). A number of sections of the NPPF are of relevance to the Study, with the most pertinent detailed within Appendix 1

2.2.3 Planning Practice Guidance [5]

A number of Planning Practice Guidance notes have been published by the Government which set criteria and standards for development within England and help support the Government planning framework. The guidance notes relate to a number of topics relevant to the build development and natural environment. The PPG pertinent to this Study are listed below, more detailed descriptions are provided in Appendix 1.

- Air Quality
- Climate Change
- Design: process and tools
- Flood risk and coastal change
- Historic environment
- Natural environment
- Open space, sports and recreation facilities, public rights of way and local green space
- Water supply, wastewater, and water quality

2.2.4 Planning (Listed Buildings and Conservation areas) Act 1990[6]

The Planning (Listed Buildings and Conservation Areas) Act 1990 outlines the specific requirements and building regulations needed for Local Planning Authorities to determine applications which preserve and enhance conservation areas, listed buildings and the heritage of an area. Local Planning Authorities should have regard to the Planning (Listed Buildings and Conservation Areas) Act 1990 when considering activities and the determination of applications within their authority boundary.

2.2.5 Somerset Minerals Plan 2030 [7]

The Somerset Minerals Plan 2030 sets out the Council's approach to planning for sustainable mineral development in Somerset until the year 2030. The Council has a responsibility to plan for providing future minerals supply and determine mineral related planning applications. According to the Somerset Mineral Plan policies map, the Study Area is located within a Mineral Safeguarding Area, where the presence of mineral resources is flagged up for consideration when deciding whether to grant planning permission. It should be noted that there is no presumption that mineral resources identified within the mineral safeguarding area will be worked, nor is it the aim of the designation to wholly prevent other development from occurring.

[4] National Planning Policy Framework - Guidance - GOV.UK (www.gov.uk)

[5] Planning practice guidance - GOV.UK (www.gov.uk)

[6] Planning (Listed Buildings and Conservation Areas) Act 1990 (legislation.gov.uk)

[7] Somerset Minerals Plan. 2015. Development Plan Document up to 2030. Somerset Council/

2.2.6 Minerals Topic Paper 6: Safeguarding Areas Version 2 (2014)[8]

The Minerals Topic Paper 6: Safeguarding Areas supports the Somerset Minerals Plan 2030 and provides detail on the topic of Mineral Safeguarding in Somerset. It is proposed that for the purposes of safeguarding all minerals currently worked should be safeguarded for the future. The Study Area is located within a Building Stone Safeguarding Area which includes a variety of stones and stone products produced to meet the local needs. It is specially for contributing to the local distinctiveness of the area and the maintenance of the built heritage.

2.2.7 Wellington Place Plan[9]

Adopted in March 2023, the Wellington Place Plan has the status of a material consideration and is referred to when determining planning applications and considering regeneration and conservation activities, to ensure the quality of place in Wellington is protected and enhanced. The Vision of the Plan is:

"Wellington will be a successful welcoming town, clearly rooted in its landscape setting of the Blackdown Hills, and the proud industrial and commercial heritage at Tonedale Mill and Tone Works"

To achieve this Vision, the Plan provides six thematic priorities which have been developed into a spatial strategy. Each spatial strategy represents a direction of travel and a collation of opportunities for the area. The Plan promoted heritage and long-term management of heritage assets which compliments the landscape. Within the Plan Tone Works and Tonedale Mill are recognised as nationally significant assets and should be included within this protection. The Plan also places a high bar for sustainability with the ambition for a carbon neutral town which uses water efficiently and effectively minimises nutrient pollution in the water network.

2.2.8 Water Quality and Nutrient Advice Letter, Natural England (2022)[10]

This Advice Note sets out Natural England's advice for development proposals which have the potential to affect water quality in such a way that adverse nutrient impacts on designated habitats sites cannot be ruled out. The Advice Note states that the Local Planning Authority should carefully consider the nutrient impacts of any new plans and projects on habitats and the integrity of habitats by considering if mitigation is required in the form of nutrient neutrality. The nutrient neutrality relevance of the study area is outlined below and in section 3.3.2.

2.2.9 Nutrient Neutrality in Somerset: Guidance for Applicants (2023)[11]

In support of Natural England's Advice Note, Somerset Council has produced guidance for applications in relation to nutrient neutrality. The guidance states that where a development falls within the catchment of the Somerset Levels and Moors Ramsar site, there is a significant issue with nutrients entering watercourses that flow through this designated site, as they adversely change the environmental conditions for species. As such Local Planning Authorities need to consider the adverse impacts of new development on the designated habitat site and development within this catchment should demonstrate that nutrient neutrality can be demonstrated, for example, through the use of a nutrient budget showing that the introduction of certain mitigation measures results in no net increase in nutrients.

2.2.10 Levelling up and Regeneration Act (2023)[12]

Receiving Royal Assent in October 2023, the Levelling-up and Regeneration Act 2023 makes provision for the setting of levelling-up missions and reporting on progress in delivering them including town and country

[8] https://somersetcc.sharepoint.com/:b:/s/SCCPublic/Ef5z_uO5Lk9Hjs7NyBNiBSkBgQUjN8nLQtppsMhQM4J_1A?e=1DjNoy

[9] SCC - Public - Wellington Place Plan - Adopted 28th March 2023.pdf - All Documents (sharepoint.com)

[10] SCC - Public - Water quality and nutrient neutrality advice letter 16 March 2022.pdf (sharepoint.com)

[11] SCC - Public - Nutrient Neutrality in Somerset - Guidance for Applicants.pdf - All Documents (sharepoint.com)

[12] Levelling Up the United Kingdom - GOV.UK (www.gov.uk)

planning, environment and heritage and nutrient pollution standards. Chapter 3 of the Act has regard to certain heritage assets in the exercise of planning functions. Section 102 subsection 1 states that when considering whether to grant planning permission, the LPA should have special regard to the desirability of preserving or enhancing the asset or its setting. Part 7 of the Act has regard to Nutrient pollution standards, including sensitive catchment areas. It is stated that when determining whether a habitats site is in an unfavourable condition by virtue of pollution from nutrients comprising nitrogen, phosphorus or compounds consideration should be had to advice from, or guidance published by, Natural England, the Environment Agency or the Joint Nature Conservation Committee[13].

2.2.11 Environment Act (2021)[14]

The Environment Act (2021) identified the targets, plans and policies for improving the natural environment within the UK. To ensure there is no loss or degradation of habitat caused by development, under the Environment Act 2021, projects and developments will need to ensure that there is at least a 10% net gain to biodiversity which is measures through biodiversity credits, biodiversity units and Biodiversity Metric 4.0.

2.3 Emerging policy and legislation

2.3.1 Somerset Council Local Plan[15]

While in early stages, Somerset Council are progressing with the production of their Local Plan. This Plan will be a single Local Development Scheme for Somerset and will include the new Somerset Local Plan and Minerals and Waste Plan. Once adopted the Plan will supersede all the former District Council Local Plans and will be used within the determination of applications within the authority area.

[13] Levelling-up and Regeneration Act (legislation.gov.uk)

[14] Environment Act 2021 (legislation.gov.uk)

[15] South Somerset Local Plan 2020 to 2040 Review

Baseline Evidence

3. Baseline Evidence

The site is considered as the waterways around Tone Works and Tone Dale mill on the Back Stream. However, there is an interest in flood risk reduction options across the upstream catchment that may provide benefit to this area. And when considering benefits, the potential benefits downstream of the site in Wellington and Taunton should be considered.

3.1 Waterways

There are two waterways relevant to this study: the River Tone and Back Stream (the upstream portion of which is called the Westford Stream). The River Tone upstream of Tone Works has an area of approximately 80km^2 and originates on the edge of Exmoor to the north west of the site. The catchment is relatively steep with many valleys along its length. The Tone continues from Wellington into Taunton and is the primary source of flooding in Taunton. The Back Stream has a smaller catchment of approximately 20 km^2 and a shallower gradient.

In the area of Tonedale and Tone Works there have been many man made changes to the watercourse, relating to the historic industrial use of the area. Including powering Tone Works and Tone Dale mill via waterwheels, and diversion of water for settlement to provide suitable conditions for dying fabric. The historic development of the waterways and their significance is well documented in the Historic England report: *"Tonedale Mill and Tone Works, Wellington, Somerset: An archaeological landscape assessment of the water management system".* A summary of the changes made and the current condition of some of the structures is highlighted in the following pages.

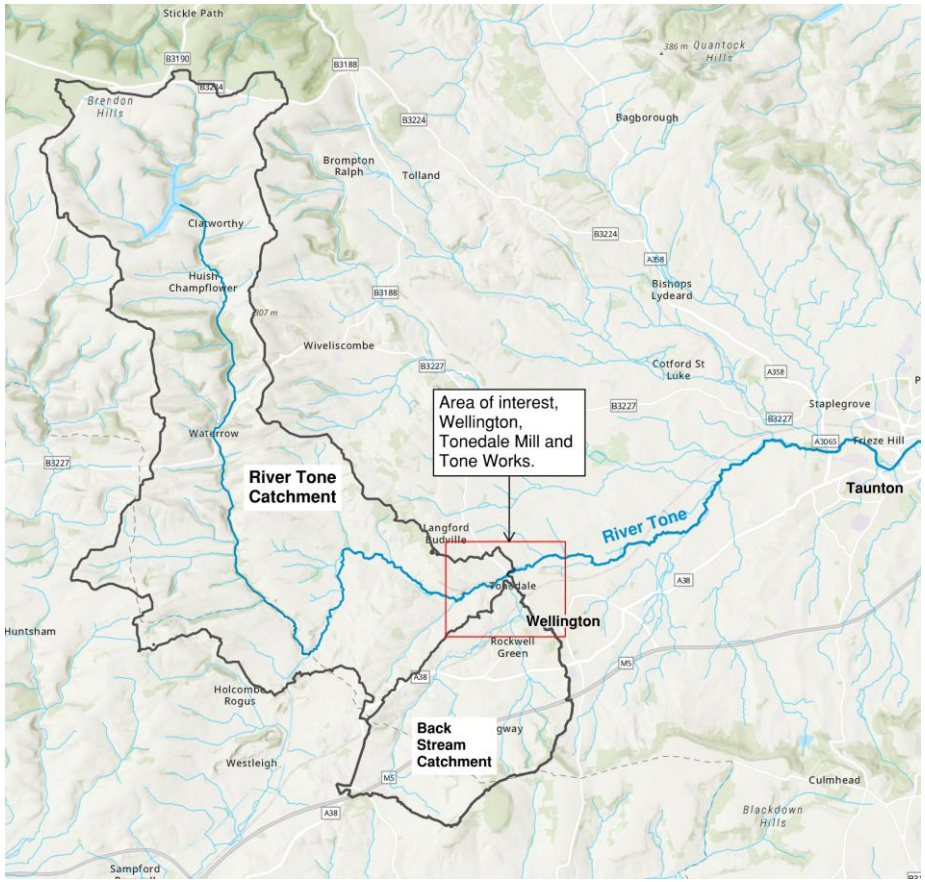
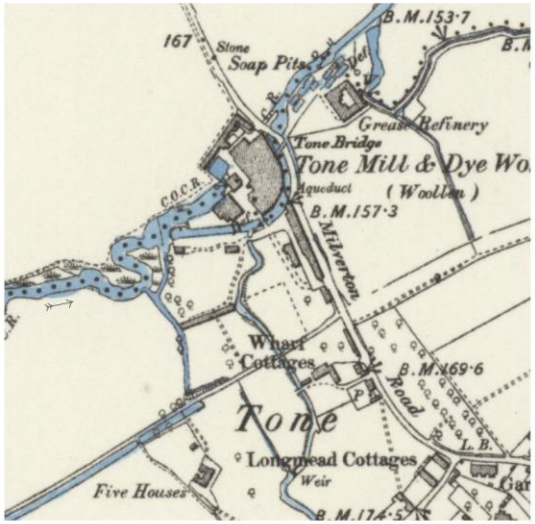


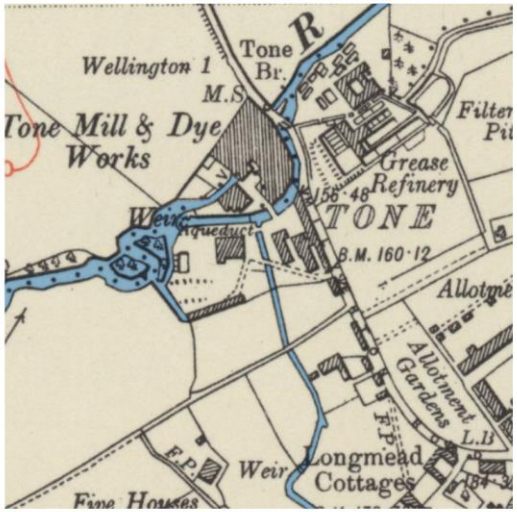
Figure 1: Map of the River Tone and Westford Brook catchments in relation to the approximate area of focus.

3.1.1 Waterways around Tone Works

Tithe Map 1840 (Somerset Council)



OS Maps 1888 (National Library of Scotland)



OS Maps 1938 (National Library of Scotland)

OS Maps 2023 (OS Outdoor)

Development of the waterways as seen today

1840 - 1888

Between 1840 and 1888 the shape of the River Tone has been substantially modified.

Around Tone Works a sharp meander has been reshaped into a softer curve around the redeveloped Tone Works building.

Upstream of the works a new weir has been installed to control inflow to the site, and the pond on the approach to the mill is widened.

Downstream of the site, another meander has been removed and the course of the River Tone straightened.

The Grand Western Canal has become disused and no longer maintained.

1888-1938

There is limited change to the area around Tone Works in terms of the waterways themselves.

There is no evidence of the historic meander downstream of the site in this map.

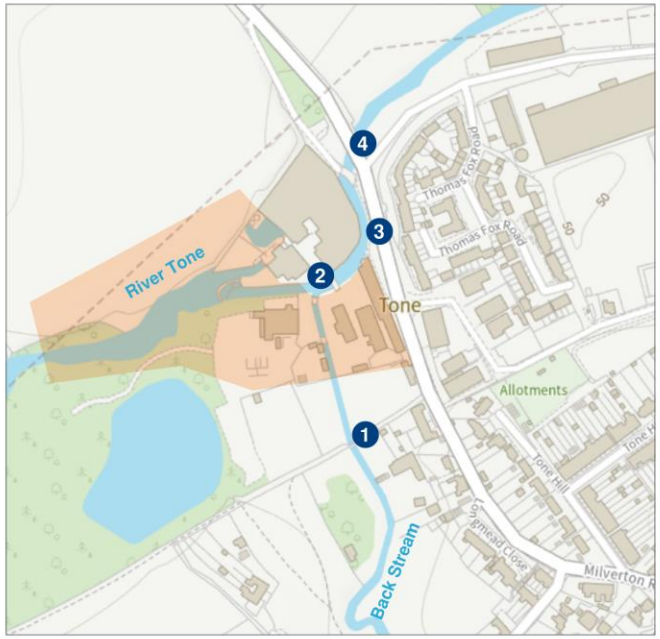
The alignment of the Back Stream has been straightened since 1888. The bed level of the back stream was lowered to increase the head difference across the waterwheel at Tonedale Mill and resulting power generated.

1938-2023

Since 1938 the B3187 has been constructed, and a new bridge is used adjacent to the historic road bridge that connected Tone Works with the rest of Wellington. This historic road bridge is no longer used for any traffic due to concerns about its structural integrity.

On maps there is a new basin shown to the south west of the site within an area of woodland and mixed scrubland. This area was not able to be visited. Satelite imagery does not show evidence of a pond in this area.

3.1.2 Structures around Tone Works



Access upstream at Tone Works was limited due to landowner restrictions to the right bank of the Tone and availability of footpaths. Areas not accessed shown in orange.

1

Canalised section of the Back Stream with a shallow bridge over the top likely to contribute to a constriction of flow.

2

View of the River Tone looking downstream from the footbridge. The vertical masonry walled banks of the river are visible.

3

Rightbank of river wall shows scour issues and undercutting. Mortar loss particularly at the base of the wall resulting in loss of stone. Vegetation throughout wall, likely to affect its structural performance.

3

View of the left bank of the river, of the Tone Works. Multiple pipes and services cross the river. Building materials vary, areas of sandstone show erosion. There was limited evidence of scour at the base, however, this cannot be confirmed without survey at close proximity. There are areas of vegetation growing from walls.

4

Outlet culverts from the Tone Works. Suspended sediment seen at the exit from these, however, no evidence of flow through the culverts.

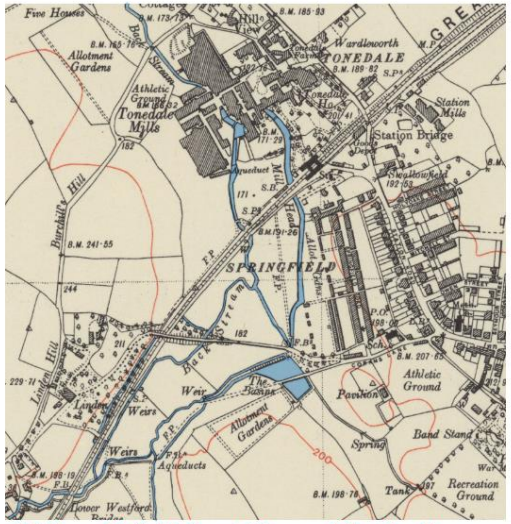
4

Historic road bridge across river Tone. Composition of the bridge varies - brick piers are visible, stone masonry on upper part of bridge.

3.1.3 Waterways around Tonedale Mill

Tithe Map 1840 (Somerset Council)

OS Maps 1888 (National Library of Scotland)



OS Maps 1938 (National Library of Scotland)

OS Maps 2023 (OS Outdoor)

Development of the waterways as seen today

1840

In 1840 Tonedale Mill and some of its associated structures are already present, including the basins, and aqueducts constructed to move water from the Back Stream into the aquaducts and to the mill.

1840-1888

During this period, the railway line was constructed bisecting the Back Stream and the aqueduct leading to the mill. The alignment of the Westford Stream has been modified so that it runs parallel to the railway and its small meanders are removed. Downstream of the railway crossing before the mill the course of the stream has also been straightened.

Aside from the waterways the area has become significantly more urbanised than in 1840.

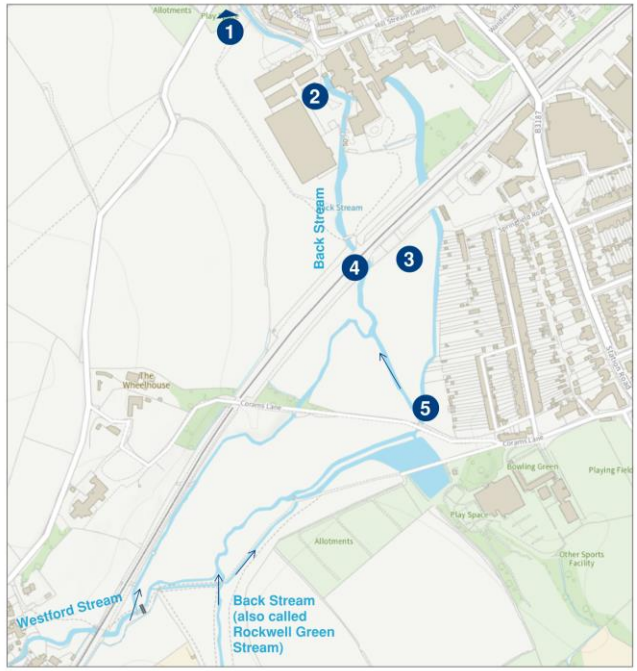
1888-1938

There is limited change to the area around Tonedale Mill in terms of the waterways.

1938-2023

Much of the watercourses in the area remain as they were over 100 years ago. In the 1990s a new weir was constructed to ensure a preferential flow path along the railway section of the stream. The basins are no longer used to control inflow along the waterwheel, and this section has little to no flow. The area between the aqueduct and the Back Stream is marshy.

3.1.4 Structures around Tonedale and the Back Stream



1 Back Stream, downstream of Tonedale Mill.

2 Historic culverted sections are structurally in very poor condition with visible sagging of the soffit of the structures.

2 Small weir on the at the Tonedale Mill site. River banks in this section are brick banked. The condition of these was not assessed.

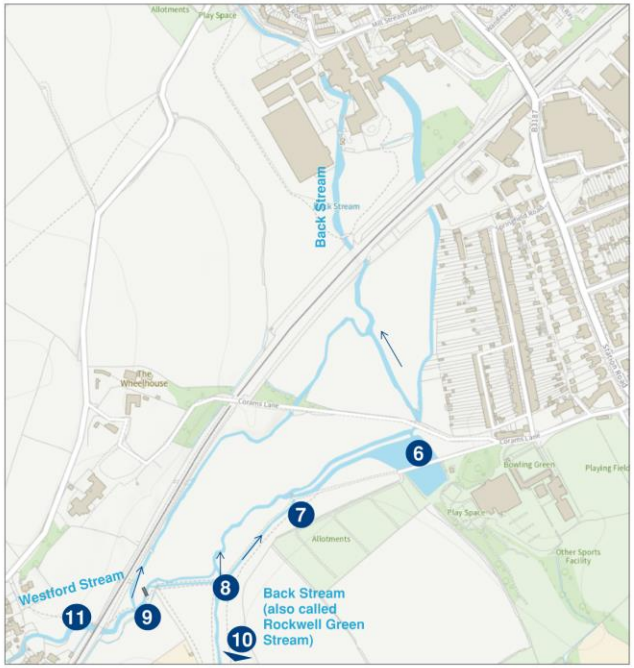
3 Bank of scrubland with potential to further develop wetland habitats. There are multiple areas upstream of the mill similar to this.

4 The remains of a historic arched bridge, upstream of the railway bridge.

4 Railway bridge over the the Back Stream. The invert of this culvert is formed by cobbles embedded in concrete.

5 Complex weir downstream of basins, an additional point of water control. Parts of the weir face were in poor condition with missing bricks.

3.1.5 Structures around Tonedale and the Back Stream continued



7

Historic structure between the Back Stream and aqueduct which holds water at a higher level.

10

Small weir on the back stream. On the left bank there is a penstock which controls flows to the 'magic tree' and the basins.

8

Meeting of the bridges, three bridges including two historic cross the multiple waterways at this location. Water emerges from beneath a tree, which is diverted through a pipe from the Back Stream to fill the basins.

11

Culverts underneath the railway line. Additional relief culverts made of concrete at a higher level are visible to the left of the photo.

6

The basins historically reserved water at high ground for use to power the mill. Today this site is a popular spot for leisure.

9

Historic flow control structure allowing water from the Westford Stream into the aqueducts towards the basins. These are dry, as a new weir on the Westford Stream, designed to reduce flood risk to the Westford Community, directs water in a continuation channel unless flows are exceptionally high.

3.2 Flood Risk

3.2.1 Fluvial flood risk mapping

National flood risk mapping indicates a high fluvial flood risk in the study area. Tone Works is in Flood Zone 3 (indicating a risk of fluvial flooding in events less than 1 in 100 years), and Tonedale Mill is predominantly within Flood Zone 2 (at risk of fluvial flooding in events less than 1 in 1000 years).

A flood storage area on the Westford Stream was constructed in the 1990s. Additional works included constructing a new weir to redirect the watercourse along a new channel adjacent to the railway.

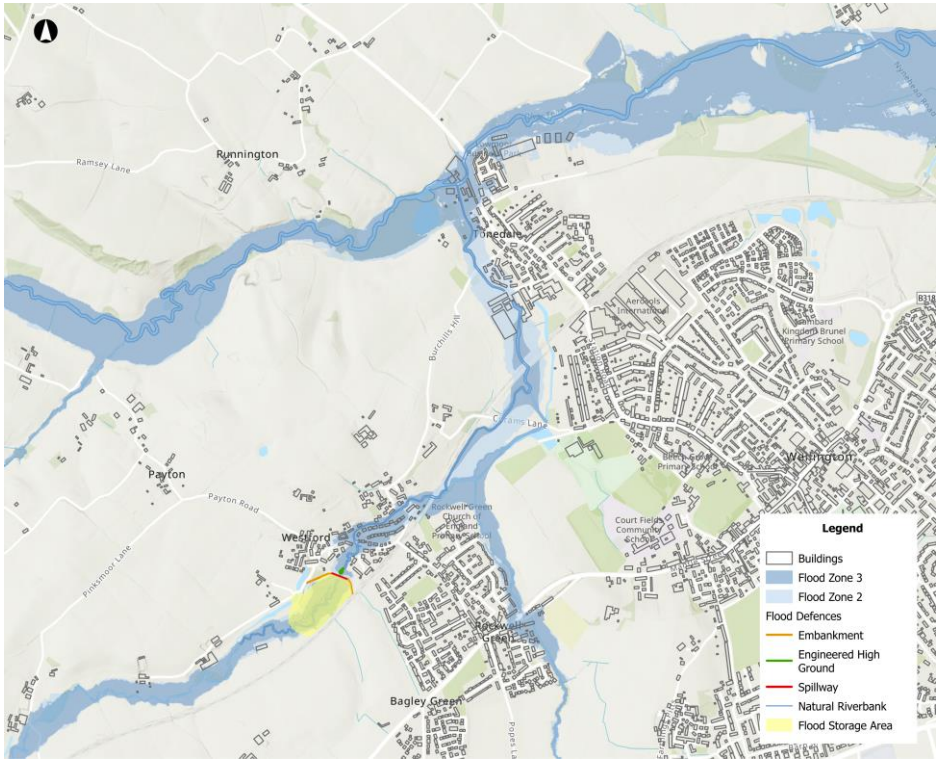


Figure 2: Plan indicating flood risk across the wider wellington area, including the flood storage area upstream of the Westford community.

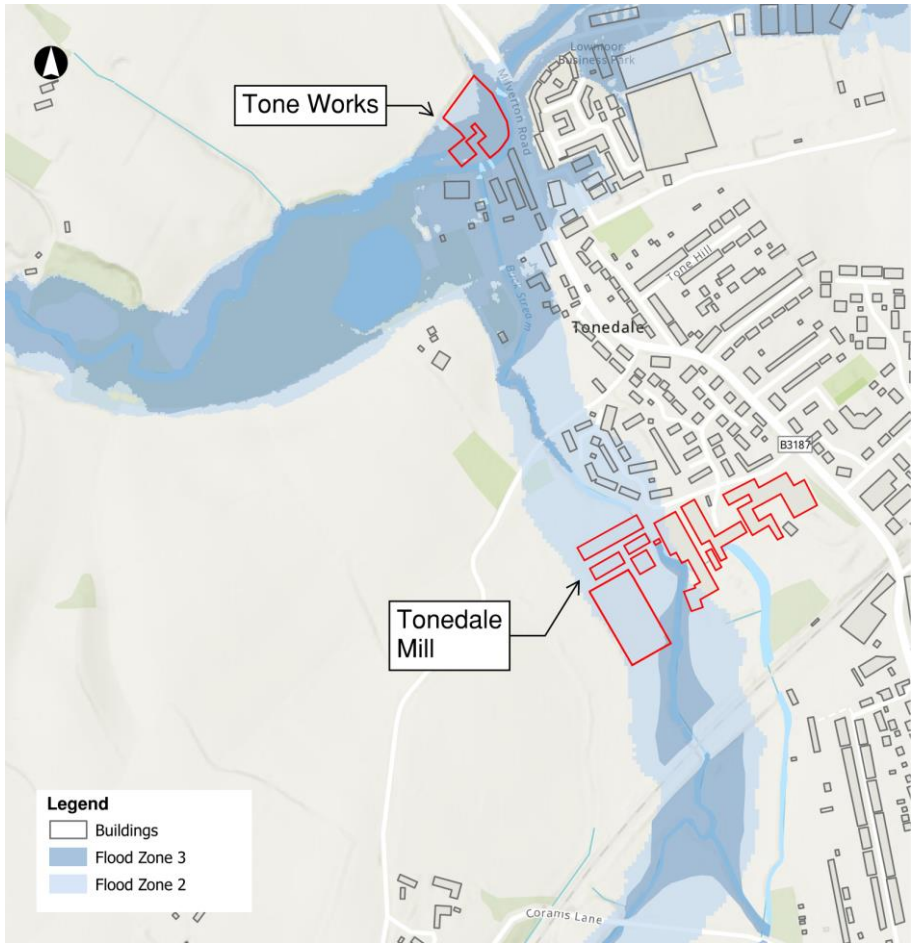


Figure 3: Flood Zone 2 and 3 in the area of interest.

Most newer properties, particularly those to the north of Tone Dale mill have been constructed with their ground floors at a raised level to reduce flood risk. No data has been provided on past flooding event. Flooding has occurred in Wellington and the surrounding areas throughout its history. From researching,

severe flooding has occurred on, 2012[16], 2014[17], Flash flooding of Rockwell Green occurred in September 2023[18].

3.2.2 Surface water flood risk

Within the area of interest there are several areas affected by surface water flooding. Notably: the field around Coram's lane, Tone Dale Mill, and the woodland area to the west of Tone Works. There are other pockets of high surface water flood risk throughout Wellington and Rockwell Green which are not evaluated as part of this study.

Climate change is likely to increase the frequency and intensity of rainfall events in the UK, leading to a greater risk from flooding in the future.

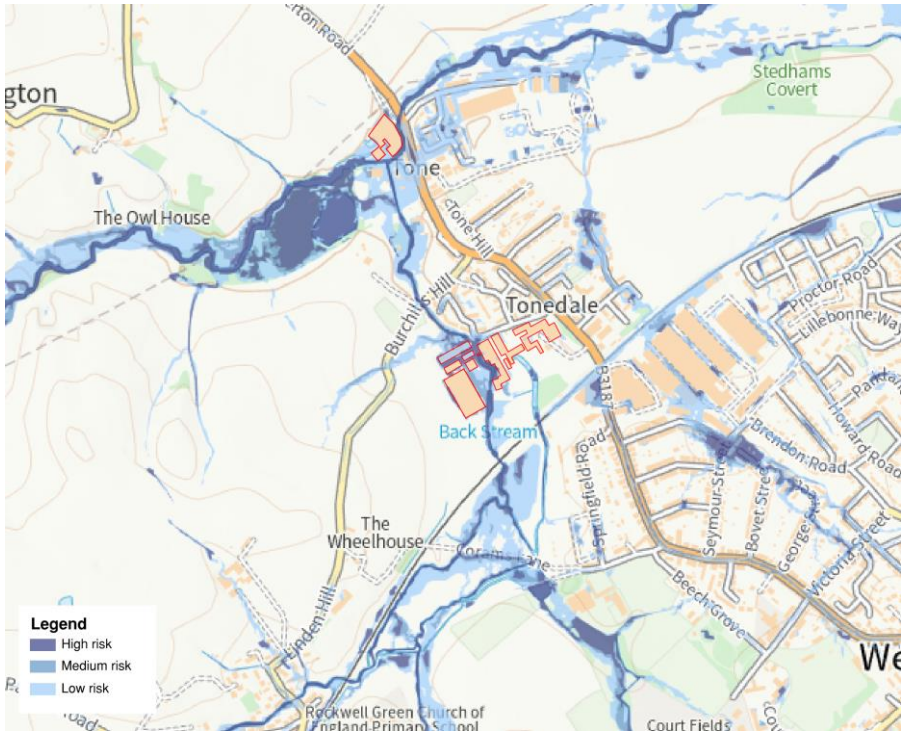


Figure 4: Surface water flood risk

3.2.3 Ground water flood risk

There is a low risk of flooding from groundwater in the Tonedale and wider Wellington area.

[16] https://www.somersetcountygazette.co.uk/news/10133030.somersets-floods-of-2012-branded-worst-in-living-memory/

[17] https://www.internetgeography.net/topics/the-somerset-levels-flood-case-study/

[18] https://www.wellington-today.co.uk/news/rockwell-green-homes-destroyed-by-horror-flash-flood-639171

3.2.4 Managing Flood Risk

The rivers within the area of interest are classified as main rivers therefore their maintenance and management is the responsibility of the Environment Agency.

The wider area, including the Back Stream upstream of Tone Dale mill, and surface water management lies with the Lead Local Flood Authority: Wellington Council under the combined Sommerset Authorities.

Following catastrophic flooding in 2013-14 across Somerset, the Somerset River Authority (SRA) was established with primary purpose to reduce flood risk. SRA is created in partnership between local councils, the Environment Agency and other stakeholders in Somerset. In their 20 year Flood Action Plan they set out the following objective which this study aims to contribute to.

The Flood Action Plan's six main objectives are:

1. Reduce the frequency, depth and duration of flooding
2. Maintain access for communities and business
3. Increase resilience to flooding for families, agriculture, businesses, communities, and wildlife
4. Make the most of the special characteristics of Somerset (with internationally important biodiversity, environment and cultural heritage)
5. Ensure strategic road and rail connectivity, both within Somerset and through the county to the South West peninsula
6. Promote business confidence and growth

The primary focus of SRA is to develop and implement flood risk management strategies and projects in addition to those provided by legislated Flood Risk Management Authorities.

3.2.5 Previous flood risk studies in the area

Tonedale Mill Flood Alleviation Options Appraisal, Final Report, Jeremy Benn Associates Ltd (JBA), 2017

Tonedale Mill flood alleviation options appraisal, details an appraisal conducted by JBA, to assess options for reducing flood risk to Tonedale Mill. The mill site is designated for residential redevelopment, necessitating flood alleviation measures to meet the NPPF standards. JBA developed a new 1D-2D hydraulic model to modern modelling standards, conducted a baseline assessment and evaluated four options to reduce flood risk.

The baseline model indicated no flooding to the site buildings in a 1 in 100 year event, but with allowance for climate change there would be flooding. Including a 40% allowance for climate change, flooding did occur. At the time of visit 3rd October for this study, the site security noted that during the September 2023 flooding in Wellington there had been flooding at the Tonedale site including fast flows over the top of the culverted section of watercourse.

The options considered for reducing flood risk in the JBA appraisal were:

1. Increase Back Stream conveyance capacity
2. Increase Mill Leat conveyance and storage capacity
3. By pass flood flows around the development
4. Upstream attenuation and storage

The proposed option was to construct flood walls between buildings and the Back Stream. As well as a number of additional interventions such as removing sections of culvert and or bridges which act to constrict flow, and improve the existing wetland habitat to the south of the site.

The hydraulic model has been requested for reference as part of this study, however, it has not been received.

3.2.6 Somerset Rivers Authority 2018-2019

The Somerset River Authority's 2018-2019 report highlighted outcomes from five workstreams (WP1 - Dredging & River Management, WP2 - Land Management including Natural Flood Management, WP3 - Urban Water Management, W4 - Resilient Infrastructure and WP5 - Building Local Resilience), including projects in the Wellington area. Notable projects included grants for maize and grassland management, hedge planting to prevent local flooding, soil property investigations for runoff reduction, and improved drainage on the A38 to reduce flooding between Wellington and Taunton. These initiatives aim to enhance land and water management, build resilience, and improve infrastructure in the region.

3.3 Water Environment

3.3.1 Water Framework Directive

The proposed WWFS is based within Somerset South and West Management Catchment. The River Tone area of the WWFS is based within Tone-Upper and Tone - Wellington to Taunton surface water body. The Tone-Upper covers a part of River Tone near Runnington, while the Tone-Wellington to Taunton covers the area after the Westford stream joins the River Tone. Tone - Wellington to Taunton and Westford stream surface waterbodies have Moderate Ecological Status, and the Tone-Upper surface water body has Good Ecological Status.

The Moderate Ecological Status for the Westford Stream surface water body can be attributed to several factors, including poor nutrient management, the encroachment of urban development, and the discharge of sewage. Similarly, the Tone-Wellington to Taunton surface water body also contends with sewage discharge issues and is impacted by riparian and in-river activities, including erosion. In contrast, the Tone-Upper surface water body maintains a Good Ecological Status. It's noteworthy that none of these water bodies are designated as artificial or heavily modified.

The proposed WWFS is based within Otter Sandstone (Upper Catchment) groundwater Body and Culmstock-Wiveliscombe groundwater Body. Both groundwater bodies have overall Poor Status.

The overall Poor Status of the Otter Sandstone (Upper Catchment) groundwater body can be primarily attributed to suboptimal agricultural and rural land management practices within its jurisdiction. Similarly, the Culmstock-Wiveliscombe groundwater body also faces challenges related to agricultural and rural land management, particularly in the pressures from inadequate nutrient management.

Waterbody data obtained from Environment agency - catchment data explorer[19] and a summary of waterbodies is presented in Table 1.

Table 1: Summary of water bodies with in WWFS area.

WFD water body name	Water body ID	Water body catchment area (km^2)	WB status
Tone-Upper Surface Water Body	GB108052021370	82.62	Good ecological status
Tone - Wellington to Taunton Surface Water Body	GB108052015481	20.95	Moderate ecological status
Westford stream Surface Water Body	GB108052015380	20.34	Moderate ecological status
Otter Sandstone (Upper Catchment) Ground Water Body	GB40801G806300	52.75	Poor overall status
Culmstock-Wiveliscombe Ground Water Body	GB40801G802000	42.77	Poor overall status

[19] Environmental agency. Catchment data explorer. (https://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/8)

3.3.2 Nutrient Neutrality

As outlined in Section 2.2 (nutrient neutrality in Somerset), the need for new development to be considered net neutral in its nutrient (phosphates or nitrates) emissions to waterbodies hydrologically-connected to protected sites is ongoing. Specifically, phosphates require consideration in Somerset and the Tone catchment, due to elevated concentrations in the Somerset Levels and Moors Ramsar site. Due to the hydrological connection of the WWFS area to the River Tone, and its downstream reaches, this project would be captured by the 'nutrient neutrality' guidance, dependant on what option(s) were pursued. Specifically, if there was an option pursued that would increase the emission of phosphates to either the River Tone or its tributary, the Westford stream, there may be a requirements to mitigate to offset this additional nutrient burden.

Mitigation can take the form of on site or off-site approaches. On-site mitigation would be the case that any development offsets itself in terms of any nutrient emissions there may be generated from it. This could include measures ranging from land-use change (e.g. to a less-intensive nutrient emitting land-use) to scheme design elements such as interceptor wetlands, Sustainable Drainage Systems, the upgrade of existing old wastewater treatment infrastructure (e.g. septic tank replacement). Off-site measures include some of the above, located not within the site of interest, or involvement in a nutrient credit trading scheme (catchment market).

Covering the River Tone catchment, there is a catchment market being operated by Somerset Council and another third-party catchment market emerging (e.g. nutrient credits, Biodiversity Net Gain offsetting). Off-site mitigation is required to influence water quality (i.e. nutrient concentrations) before the point at which water from the site reaches the Somerset Levels and Moors Ramsar site. This could be located upstream of the study site or in between study site and Ramsar site.

It is unlikely that any options pursued for this study would lead to an increase in nutrient emissions to the River Tone as a result of the type of project which are subject to the 'nutrient neutrality' guidance:

- New residential units – including tourist accommodation;
- Commercial developments – where overnight accommodation is provided;
- Agricultural Development – additional barns, slurry stores, and any development likely to lead to an increase in herd size;
- Anaerobic Digesters; and
- Possibly some tourism attractions.

However, any placemaking opportunities that increase the rate of tourism to the Study area are potentially subject to the 'nutrient neutrality' guidance due to an increase in wastewater generation from users of catchment facilities.

There is also potential for options pursued, if not subject to the nutrient neutrality guidance themselves, to be used as off-site mitigation for other schemes in the River Tone catchment. This would be subject to the necessary consultation with Somerset Council as the LPA and require to be secured during the planning application process via a section 106 agreement.

3.3.3 Catchment Geology

The British Geological Survey (BGS)[20] 1:50,000 scale mapping indicates that the River Tone and Westford stream channels underlain by sedimentary superficial deposit.

The bedrock geology beneath the site is the sandstone formation of the Sherwood Sandstone Group. Small upstream area of the river Tone is within Chester Formation – Conglomerate that also belongs to Sherwood Sandstone Group. Also, the small upstream part of the Westford stream is located within Sidmouth Mudstone Formation.

3.3.4 Topography

The upper part of River Tone is surrounded by hills, that begins on northwest of the Runnington (highest peak is 120 mAOD). However, there is a higher

[20] The British Geological Survey Interactive Map (see: https://bgs.ac.uk)

area in between the upstream part of the river Tone of WWFS and the Westford stream (highest peak is 87 mAOD). Westford stream is surrounded by smaller hills southeast side (highest peak is 80 mAOD).

3.3.5 Land Use

The upstream part of the River Tone and the Westford stream of WWFS consists of green areas. However, the rest of the WWFS area is mainly residential. The upstream part of each watercourse comprises ponds and water storage capacity. The proposed study will look into a creative way of using these areas.

3.4 Ecology and Biodiversity

It is only possible to deliver clear and measurable biodiversity conservation outcomes if there is a robust biodiversity baseline. A desk study and field survey were undertaken to characterise the ecological context of the WWFS Study area, establishing the drivers for biodiversity loss, options for net improvements and potential design considerations.

Development of a robust baseline means that any outcomes can be appropriately measured. This will ensure that any proposed options could adhere to the IUCN Global Standards for Nature-based Solutions (NbS)[21] at future detailed design stages.

Several resources were consulted during the desk study, including:

- Department for Environment, Food and Rural Affairs (Defra's) Multi-Agency Geographic Information for the Countryside (MAGIC) website[22]
- Natural England (NE) website[23]
- Joint Nature Conservation Committee (JNCC) website[24]
- LandIS Soilscapes Viewer[25]
- Historical ecology survey reports/biodiversity mapping for the area[26, 27, 28]
- Somerset's Ecological Network[29]
- Taunton Deane Borough Council Adopted Core Strategy 2011 – 2028[30]
- The Somerset Biodiversity Strategy 2008 – 2018[31]
- Somerset Pollinator Action Plan 2018 – 2028[32]
- Somerset Biodiversity leaflet[33]
- Requests for Information (RFIs) submitted and received from Somerset Council over September and October 2023

[21] IUCN (2020). Global Standard for Nature-based Solutions. First edition. Gland, Switzerland: IUCN.

[22] Defra. Multi-Agency Geographic Information for the Countryside (MAGIC) website. Available from: https://magic.defra.gov.uk/MagicMap.aspx [Accessed Oct 2023]

[23] Natural England Designated Sites View website. Available from: https://designatedsites.naturalengland.org.uk/SiteSearch.aspx [Accessed Oct 2023]

[24] Joint Nature Conservation Committee (JNCC) website. Available from: https://jncc.gov.uk/ [Accessed Oct 2023]

[25] LandIS. Soilscapes Viewer. Available from: https://www.landis.org.uk/soilscapes/ [Accessed Oct 2023]

[26] JBA Consulting (2017) Tonedale Mill, Wellington - Preliminary Ecological Appraisal

[27] JH Ecology (2022) Tone Works, Tone Mills North, Milverton Road, Wellington, Somerset. Ecological Appraisal

[28] Architectural Thread (2021) Tone Works Biodiversity and Habitats

[29] Somerset County Council (2019) Somerset's Ecological Network

[30] Taunton Deane Borough Council (2011) Adopted Core Strategy 2011 – 2028

[31] Somerset Biodiversity Partnership (2008) Wild Somerset The Somerset Biodiversity Strategy 2008 - 2018

[32] Somerset County Council (2018) Somerset Pollinator Action Plan 2018 – 2028

[33] Somerset County Council (2014) A better future for Somerset's natural environment

- 1:25k Ordnance Survey (OS) and aerial imagery mapping

An experienced Arup ecologist conducted a high-level survey of the ecology Study corridor (Figure 5: Ecology study corridor) on 12th October 2023, accompanied by an Arup water scientist. A predetermined walkover route was planned using public rights of way (PRoW), informed by data obtained during the desk study which highlighted potential biodiversity hotspots. The walkover comprised a high-level scoping study to further establish enhancement opportunities, design considerations, potentially sensitive areas with regard to protected/notable species[34] and the likely necessity for further targeted faunal and floral surveys.

As the visit was conducted via PRoW only, not all of the Study corridor was accessible, and areas that were accessed were only subject to a high-level review rather than a detailed botanical or wildlife survey. When options have been refined and/or selected, affected areas will likely require a full habitat survey (following UK Habitat Classification (UK Hab) methodology) and detailed biodiversity net gain (BNG) baseline assessment to inform design and the requirement for additional Phase 2 surveys.

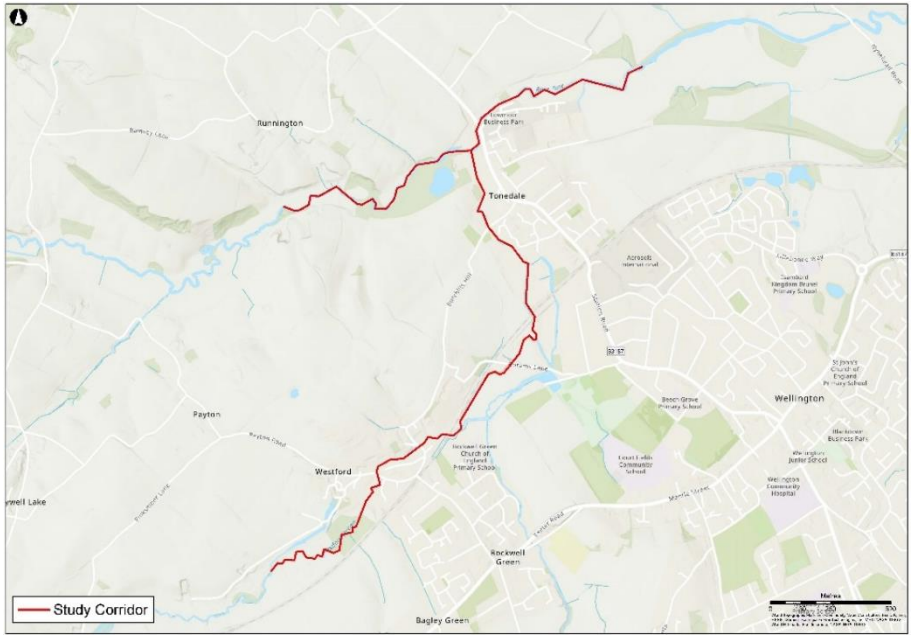


Figure 5: Ecology study corridor

3.4.1 Designated Sites

Statutory Designated Sites

There are two statutory international designated sites (IDSs) within 10km of the Study corridor (Figure 6). The Holme Moor and Clean Moor Special Area of Conservation (SAC) is located approximately 4.64km northwest and is designated for Annex I fen habitats. The Quants SAC is located approximately 6.3km southeast and is designated for the Annex II marsh fritillary butterfly (*Euphydryas aurinia*).

The Holme Moor and Clean Moor SAC is located upstream of the site and is therefore unlikely to be impacted by any of the proposals. As such it does not

[34] Relevant species included all those protected by European or UK law, and notable habitats/species including those identified as being of principal importance (HPIs/SPIs) in England, in response to Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006

require further consideration. Marsh fritillary butterflies require damp, tussocky grassland or chalk grasslands[35]. Habitats in the vicinity of the Study corridor could provide suitable supporting and/or stepping-stone habitat for the Quants SAC, presenting both a risk (*i.e.*, ensuring impacts to the SAC are avoided) and an opportunity (*e.g.*, enhancing or creating supporting habitat).

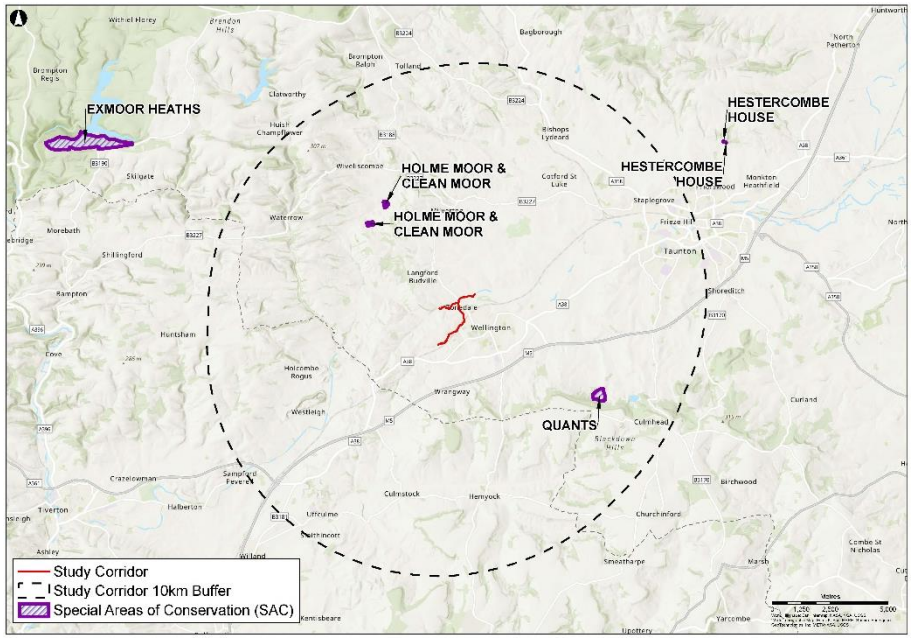


Figure 6: Statutory international designated sites within 10km

The Study corridor is also hydrologically connected to (upstream of) both the Severn Estuary European Marine Site (EMS) (comprised of the Severn Estuary SAC, Special Protection Area (SPA) and Ramsar site) (located approximately 23km northeast) and the Somerset Levels and Moors SPA and Ramsar site (located approximately 17km east). The Severn Estuary EMS is designated for its Annex I estuarine habitats, and Annex II fish and bird species and assemblages. The Somerset Levels and Moors SPA and Ramsar site is designated for its diverse, rare invertebrate assemblage and Annex II bird species and assemblages. Improvements to water quality as a result of WWWFS would therefore benefit these IDSs, but as with the Quants SAC, any potential impacts may require assessment within a Habitat Regulations Assessment (HRA) report.

There is one Site of Special Scientific Interest (SSSI) and two Local Nature Reserves (LNR) within 2km (Figure 7). The Langford Heathfield SSSI is located approximately 1.8km northwest and is designated for its neutral marshy grassland, ancient woodland and an outstanding assemblage of resident breeding butterflies.

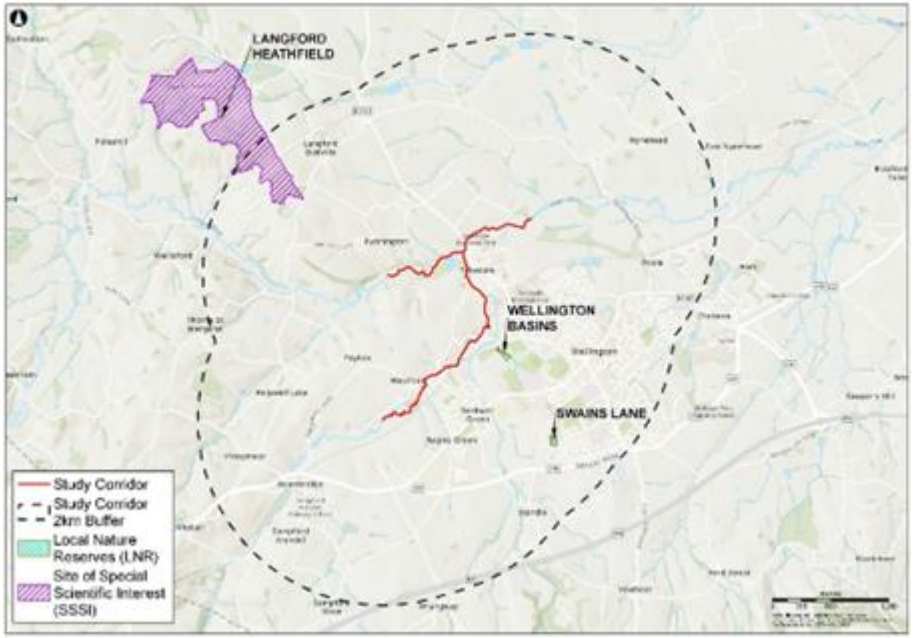


Figure 7: Statutory national and local designated sites within 2km

The Wellington Basins LNR is located within the Study area to the southeast, and is designated for a pond and its margins, and the bat and bird species it supports. The Swains Lane LNR is located approximately 1.1km south and

[35] Butterfly Conservation. Marsh Fritillary *Euphydryas aurinia* Factsheet

comprises fields and a pond which supports great crested newt (*Triturus cristatus*), palmate newt (*Lissotriton helveticus*) and common toad (*Bufo bufo*).

The Study area also appears to fall within the SSSI Impact Risk Zones (IRZs) for Langford Heathfield SSSI and the Holme Moor and Clean Moor SSSI. However, none of the proposal types are relevant to this Study, and these IRZs are therefore not considered any further.

Non-Statutory Designated Sites

The location of local non-statutory designated sites (*e.g.*, Local Wildlife Sites (LWSs) or Site of Importance for Nature Conservation (SINCs)) are not publicly available. However, the 2022 Preliminary Ecological Appraisal (PEA)[27] which was conducted for remedial/repair works at the Tone Works highlighted the presence of 15 LWSs within 2km of the Tone Works buildings.

The River Tone itself and its tributaries are designated as an LWS (the River Tone and Tributaries LWS), for its variety of habitats and legally protected species. The Winsbeer LWS is also located relatively nearby, approximately 60m southwest of the Tone Works site and designated for its unimproved marshy grassland, willow carr and pond.

All other LWSs were located over 500m from the site and designated for a range of habitats (including woodland, grassland, parkland, streams, veteran trees and buildings), and the protected/notable species they support.

3.4.2 Habitats

Tree Preservation Orders (TPOs), Ancient Woodland Inventory (AWI) sites and Habitats of Principal Importance (HPIs)

One Ancient Replanted Woodland AWI site is located approximately 450m west of the Study corridor. Three HPI types were identified within 500m, including several deciduous woodland parcels immediately adjacent to/overlapping the Study corridor, traditional orchards to the northwest and good quality semi-improved grassland to the west (Figure 8).

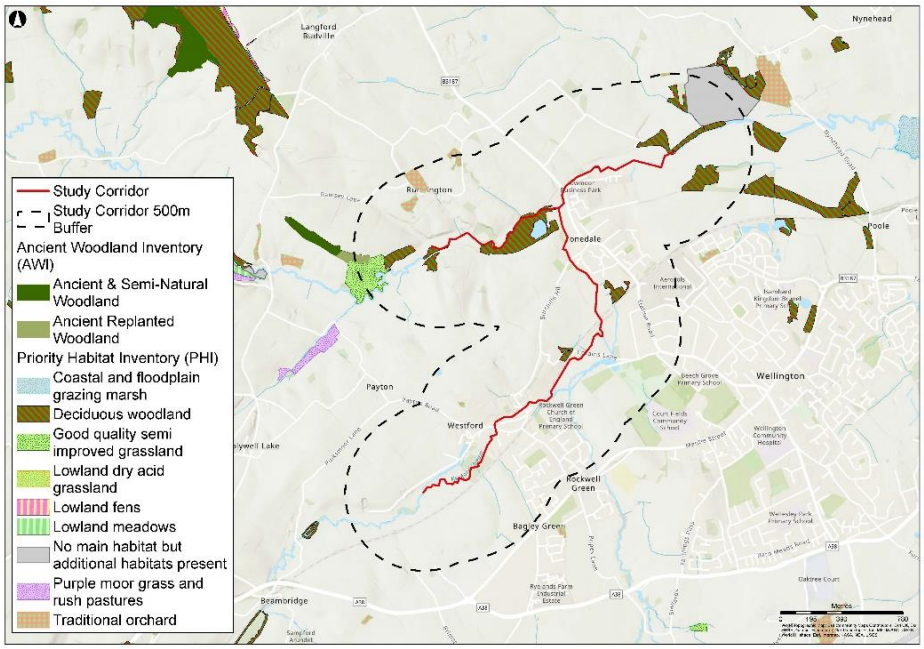


Figure 8: HPIs and AWIs within 1km

A review of the National Habitat Network (NHN) on MAGIC, which is a spatial dataset based on priority habitats, established that the Study corridor also falls within the Network Expansion Zone and Network Enhancement Zones 1 and 2 for some of the HPI parcels identified in Figure 8.

Network Enhancement Zone 1 comprises land within close proximity to the HPI parcel which is more likely to be suitable for habitat re-creation for the particular habitat, based on soils, hydrology and altitude. Network Enhancement Zone 2 includes land within close proximity that is unlikely to be suitable but where other types of habitats could be created or land management may be enhanced to deliver a supporting resource. The Network Expansion Zone is land within relatively close proximity to the Network Enhancement Zones 1 and 2 that is suitable for habitat creation and for strategic, landscape-scale connectivity.

A total of nine TPOs were provided by Somerset Council in the vicinity of the Study corridor. There are none along the River Tone corridor. Five of these (lime (*Tilia x europaea*), sycamore (*Acer pseudoplatanus*), beech (*Fagus*

sylvatica), sweet chestnut (*Castanea sativa*) and Lucombe oak (*Quercus x crenata*)) are in urban areas within Tonedale. An oak (*Quercus* sp.) and two ash trees (*Fraxinus excelsior*) are present within field boundaries to the east of Tonedale. One oak tree is located within the grounds of the Tonedale Mills just south of the Burchills Hill Play Area, at approximate OS National Grid Reference (NGR) ST 12699 21374.

TPOs may be in place for amenity or cultural heritage value as well as for biodiversity. TPOs should be retained within the design, but potential interactions should be reviewed at later project stages to inform any mitigation requirements.

Strategic Habitat Mapping

The NPPF requires LPAs to identify ecological networks in order to deliver the protection, enhancement and maintenance of biodiversity. Therefore, there is a duty for Somerset Council to include ecological network mapping within the forthcoming Somerset Local Plan. For Somerset, the ecological network mapping comprises four broad habitat types: broad-leaved woodland, priority grasslands (including calcareous, neutral and acid), heathland and acid grassland, and fen, marsh and swamp[36].

The Somerset Ecological Networks Report[29] previously identified core areas, dispersal areas, stepping stones, sustainable use areas and restoration areas for the four broad habitat types. However, this was not to a high enough resolution to understand the network around the Study corridor.

Prior to the publication of the Somerset Local Plan, the Somerset West and Taunton Council adopted Local Plan included a green infrastructure strategy which highlighted areas for enhancement and creation (Figure 9).

The River Tone is highlighted as an essential blue corridor with opportunities for enhancement, with the riparian corridor along the Westford Stream also being highlighted as a green link for enhancement. Much of the west of Wellington and Tonedale is highlighted as a 'green wedge' for enhancement and extension.

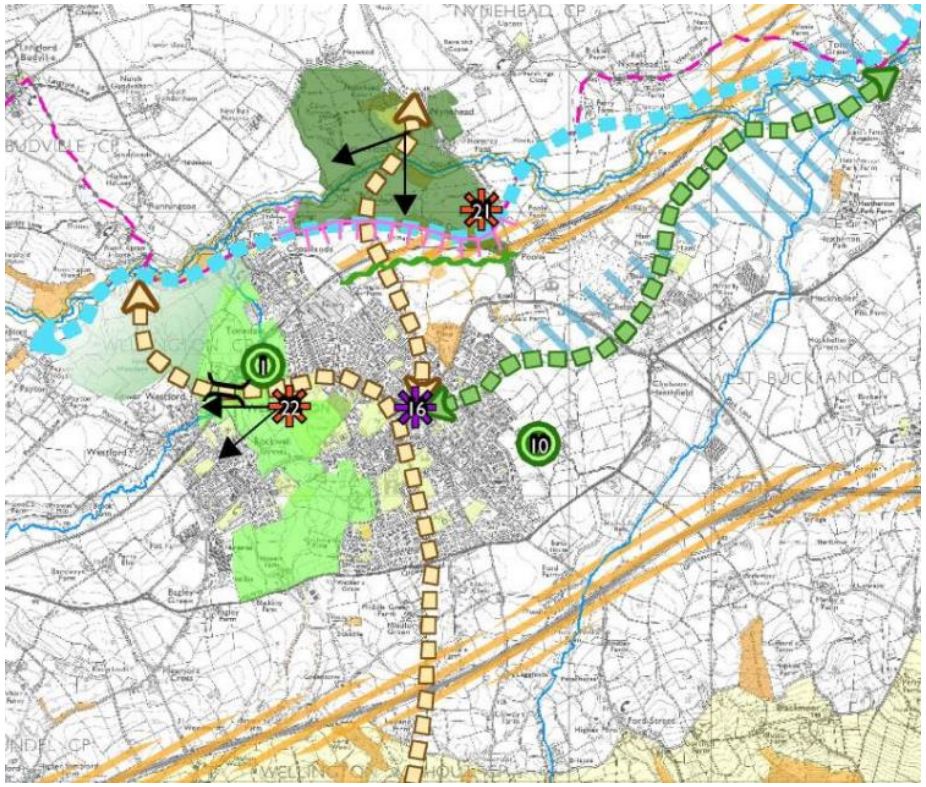


Figure 9: Taunton Deane Green Infrastructure Strategy. © Taunton Deane Borough Council[30]

The Somerset Biodiversity Strategy provides a Nature Map to identify 'Strategic Nature Areas' (SNAs) at a landscape-scale to represent the best areas to maintain and expand wildlife habitats through management, restoration

[36] Somerset Environmental Records Centre. Ecological Networks. Available from: https://www.somerc.com/products-services/ecological-networks/ [Accessed November 2023]

and/or re-creation. The woodland corridor along the River Tone in the Study corridor is highlighted as an SNA.

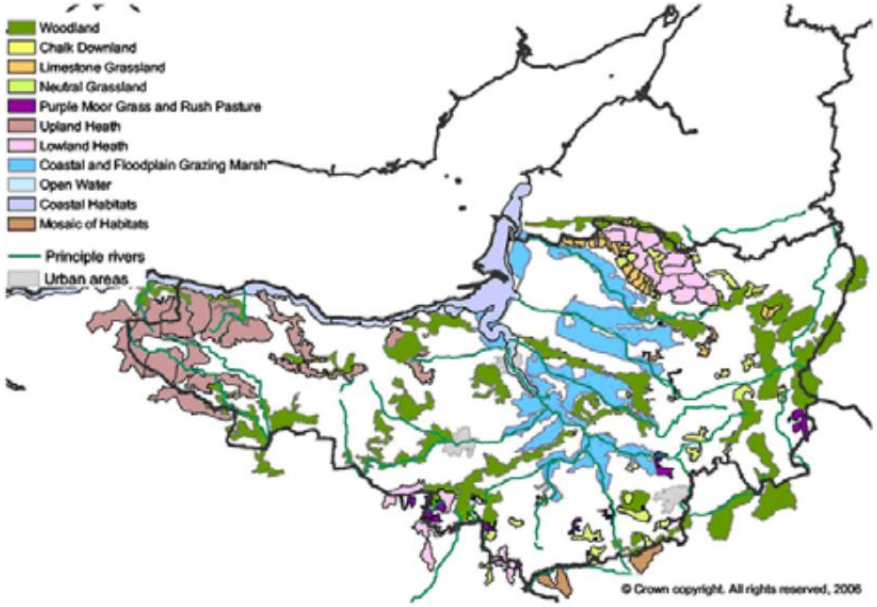


Figure 10: South-West Nature Map. © Somerset Biodiversity Partnership[31]

These interim strategic habitat maps are likely to be superseded by Ecological Network mapping when it is published within the Somerset Local Plan, but in the meantime, options should aim to align with identified strategic mapping for the county.

Soils

There are three soil types across the Study corridor and in the immediate vicinity[25]. Along the River Tone to the east of Tonedale, the soil is loamy, clayey and naturally wet with moderate fertility. Along the River Tone to the west of Tonedale, the soil is loamy and freely draining with low fertility. The soil across the south of the Study corridor is loamy and clayey, with moderate to high fertility and slightly impeded drainage.

Habitat Distinctiveness and Condition

Previous ecology surveys of the areas immediately around the Tone Works site[26, 27, 28] identified arable and pastoral fields with dense hedgerows, dilapidated buildings, scrub, grassland and mature trees. The wider landscape comprises residential and commercial developments and agricultural fields. A general description of the habitats identified during the desk study and field survey is provided for discrete sections of the Study corridor (Figure 11) under relevant headings below. A summary of the various habitat conditions is then provided, along with how biodiversity value is greater or more limited.

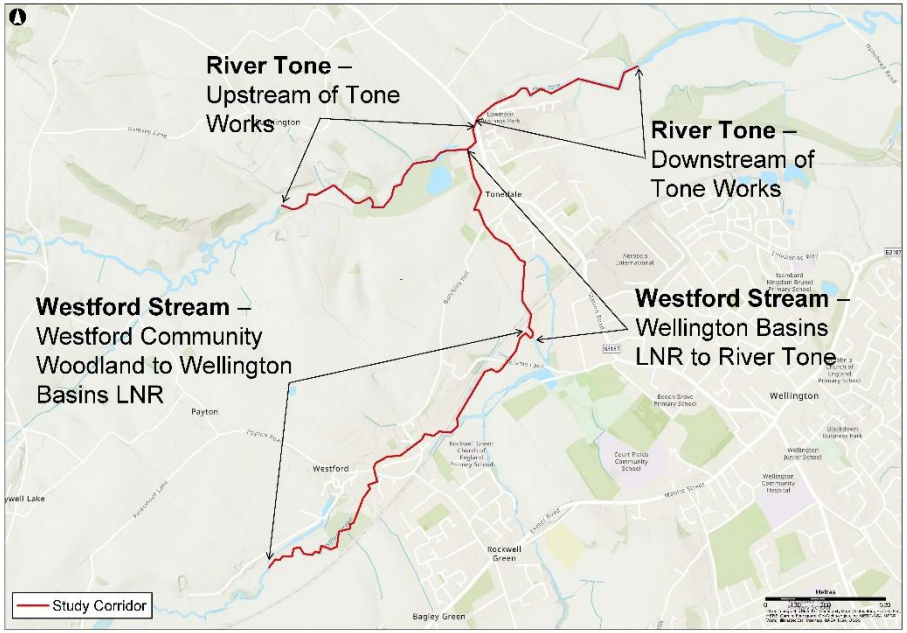


Figure 11: Ecology survey sections

River Tone – Upstream of Tone Works

The southern edge of this section is dominated by a deciduous woodland HPI which contains a large, inaccessible lake. The north comprises pastoral and arable fields with mature, dense hedgerows. To the west, the riparian corridor is lined with trees and likely still relatively shaded. The River Tone is

reinforced in the vicinity of the Mill, with limited aquatic marginal growth and heavy shading of the banks from trees and scrub. To the east of this section, the bank top region is encroached by the industrial buildings and associated hardstanding. Several dilapidated buildings, including the Mill buildings themselves, are present in this section.

River Tone – Downstream of Tone Works

The River Tone is more constrained in this section, with the Lowmoor Business Park industrial estate and a horse-grazed paddock to the south west, and arable fields to the south east and north. The buildings and warehouses in the industrial estate appear newer and better sealed than those around the Mill. The river itself is again shaded by bankside trees and scrub, which connect into the hedgerow and woodland copse network in the wider landscape, including more deciduous woodland HPI parcels to the east.

Westford Stream – Westford Community Woodland to Wellington Basins LNR

The central section of the stream through Westford is very constrained with artificial reinforcements, and residential development and associated amenity habitats to the north and south.

To the west and east of this section there is a diverse mosaic of semi-natural habitats, including tussocky grassland, scrub, hedgerows and tree lines with mature trees, and woodland which shades the stream. In the west there is the Westford Community Woodland and a large floodplain storage field. To the east, there are multiple threads of the stream where it has been artificially diverted in the vicinity of the Basins. Several sections are very heavily reinforced, including significant culverts under transport infrastructure. Other sections are more natural, with earthy/sandy banks and varied flow.

In the wider landscape is a combination of agriculture and residential development.

Westford Stream – Wellington Basins LNR to River Tone

The stream flows south to north, from the Wellington Basins LNR to its confluence with the River Tone. It flows through a relatively diverse mosaic of urban, semi-natural and amenity habitats, from the ornamental lakes in the south, through amenity and tussocky grassland fields (including the Fox's Field community space), scrub, woodland corridors, dense hedgerows and tree lines, to the site of the Mill in the north. In the north, the stream is heavily reinforced and shaded through the industrial site, but it becomes more open with greater flow variation in the south, including an eroding cliff bank and mature trees on the bank top/bank face.

The derelict Tonedale Mills building is present in the centre, with more residential and commercial developments present to the east and arable and pastoral fields to the west.

Summary

Overall, the biodiversity value on site appears to be good. There is a diversity of semi-natural habitats, despite the relatively urban context and connectivity of hedgerows and tree lines between woodland and scrub parcels enables species dispersal into the wider landscape.

General limitations to biodiversity value included likely nutrient enrichment from agricultural run-off and flood events, artificial reinforcements and shading of watercourses, public disturbance and erosion, and presence of invasive non-native species (INNS).

Below is a summary of the habitats on site and the biodiversity value they each represent, in BNG terms (regarding habitat distinctiveness and a high-level, preliminary assessment of condition):

- River Tone – high distinctiveness habitat. Not much of the River was accessible from PRoW, but limitations to condition include artificial reinforcements around the Tone Works, shading reducing the variety of aquatic marginal vegetation, potential overdeepening and presence of Himalayan balsam (an INNS).
- Westford Stream – high distinctiveness habitat. Condition varies along the length, with more diverse flow and feature richness creating a better condition and more shaded and artificially reinforced sections representing poorer condition.

- Agricultural fields – low distinctiveness and poor condition. The exception to this would be where there are arable field margins, which would require a more detailed botanical field survey to establish.
- Hedgerows and tree lines – vary across the site depending on species-richness and structure from low to high distinctiveness, but all likely in moderate to good condition. Hedgerows provide an important wildlife corridor through urban and agricultural habitats.
- Woodland – medium to high distinctiveness and varying condition. The woodlands present on site are semi-mature and appeared to be predominantly native with several veteran trees present. They are subject to erosion and disturbance from dogwalkers, limiting potential for regeneration, and are likely enriched by flooding and agricultural surface run-off, leading to a non-diverse ground flora and shrub layer.
- Scrub – medium distinctiveness and varying condition. Scrub provides a good buffer around woodland habitats, however, there is a risk it may encroach into more valuable grassland habitats if left unmanaged.
- Buildings – buildings and other developed land represent a habitat of very low distinctiveness and negligible condition in BNG terms. However, several buildings on site offered significant opportunities for roosting bats and nesting birds (described further in the next section).

With regards to strategic significance, woodland and grassland is identified within the Ecological Network Report[29] and the woodland corridor along the River Tone is highlighted in the SNA (Figure 10). The River Tone and Westford Stream and associated semi-natural riparian habitats were also highlighted as important wildlife corridors (Figure 9). Ecological network mapping in the forthcoming Somerset Local Plan, as well as a guidance note on BNG in Somerset will establish an approach to strategic significance for BNG in the county.

3.4.3 Protected/Notable Species

The habitats present within the vicinity of the Study corridor provide suitable habitat for a variety of species and species groups. Overall descriptions of habitat suitability and species potential are provided within Table 2.

.

Table 2: Potential for protected/notable species within or adjacent to the Study area established during the field survey and desk study

Species/ Group	Description of Potential
Bats	Previous ecology surveys confirmed the presence of bat roosts within buildings around the Tone Works site, including rare (Annex II) greater horseshoe (*Rhinolophus ferrumequinum*) and lesser horseshoe (*Rhinolophus hipposideros*), as well as brown long-eared (*Plecotus auritus*), common pipistrelle (*Pipistrellus pipistrellus*), Daubenton's (*Myotis daubentonii*), Natterer's (*Myotis nattereri*), soprano pipistrelle (*Pipistrellus pygmaeus*) and whiskered bat (*Myotis mystacinus*). This included a hibernation roost of a Myotis species. In addition to the species already identified, European Protected Species (EPS) licence records on MAGIC also confirmed the presence of serotine (*Eptesicus serotinus*) and the third rare (Annex II) species; barbastelle (*Barbastella barbastellus*), approximately 1.1km west and 2.7km south east of the Study corridor, respectively. Woodland habitat, veteran or ancient trees, other buildings and bridges along the Study corridor present further roosting opportunities, whilst dense hedgerows, woodland edges and riparian corridors offer optimal commuting and foraging habitat.
Hazel dormouse	Dormice (*Muscardinus avellanarius*) were recorded during previous surveys within hedgerows and scrub around the Tone Works site. EPS licence records on MAGIC also confirmed the presence of dormice in the area. Woodland, scrub, hedgerow and treeline habitats offer ample habitat for dormouse with good connectivity into suitable habitats in the wider landscape.
Riparian mammals	Previous surveys recorded otter (*Lutra lutra*) on the River Tone with prints found in buildings on site and a historic otter holt. The River Tone and ponds (including the Wellington Basins) offer good foraging opportunities; however, the Westford Stream was considered unlikely to support a significant fish population due to the presence of artificial structures within the watercourse. Sheltered woodland and scrub habitats, and mature trees along the Study corridor offer good potential resting and breeding habitat. Water vole (*Arvicola amphibius*) potential is limited where the watercourses are fast flowing, shaded and artificially reinforced. However, where there is more aquatic marginal vegetation offering foraging opportunities and burrowing cover, and the banks are earthy and stepped, suitability is greater. There are historic records of water vole downstream on the River Tone and within the Basins LWS. Furthermore, water vole were highlighted on the interpretation board for Westford Community Woodland. If American mink (*Neovison vison*) (an INNS) are present, this would reduce suitability for water vole as mink predate upon water vole.
Badger	Grassland and arable fields with dense hedgerow and tree line field boundaries, along with scrub and woodland habitats offer suitable habitat for badger (*Meles meles*), both for foraging and sett building. Setts and field signs of badger have historically been recorded along the Study corridor (*e.g.*, in Fox's Field).
Birds	Hedgerows, trees, woodland, scrub and buildings provide suitable bird nesting habitat. The eroding cliff bank on the Westford Stream to the south of Fox's Field offers suitable habitat for nesting kingfisher (*Alcedo atthis*). Kingfisher and barn owl (*Tyto alba*) were previously recorded around the Tone Works site. Arable fields offer suitable nesting habitat for ground nesting agricultural birds, such as skylark (*Alauda arvensis*).
Reptiles	Presence of common reptile species is likely, with slow-worm (*Anguis fragilis*), common lizard (*Zootoca vivipara*), adder (*Vipera berus*) and grass snake (*Natrix helvetica*) all previously recorded. Tussocky grassland, scrub and watercourses provide optimal habitat for basking, foraging and refuge.
Amphibians	Tussocky semi-improved grassland, woodland, scrub and some ponds along the Study corridor provide suitable habitat for breeding and hibernating amphibians, including great crested newt (*Triturus cristatus*), palmate newt (*Lissotriton helveticus*), smooth newt (*Lissotriton vulgaris*), common frog (*Rana temporaria*) and common toad (*Bufo bufo*). However, the Wellington Basins are unlikely to support great crested newt due to their size and presence of fish and waterfowl, and the River Tone, Westford Stream and urban habitats (including roads and railway) likely represent a significant barrier to movement for great crested newt into ponds in the wider landscape. EPS licence records on MAGIC confirm the presence of great crested newt in the area, and great crested newt and common toad were also highlighted on the interpretation board for Westford Community Woodland.
White-clawed crayfish	Certain sections of the River Tone and Westford Stream may offer suitable habitat for white-clawed crayfish (*Austropotamobius pallipes*), where there is a suitable gravel substrate with submerged logs, stones, rocks or tree roots for refuge.

Species/ Group	Description of Potential
	If American signal crayfish (*Pacifastacus leniusculus*) (INNS) are present, this would reduce suitability for white-clawed crayfish, due to outcompeting the native crayfish and being a carrier of crayfish plague (a fungal disease).
Other invertebrates	The diverse mosaic of semi-natural habitats on site offers suitable habitat for notable aquatic and terrestrial invertebrates. Notable species previously recorded on site include the ghost moth (*Hepialus humuli*), brown hairstreak (*Thecla betulae*) and silver-washed fritillary (*Argynnis paphia*). The Quants SAC (6.3km south east) is designated for the Annex II marsh fritillary butterfly, for which suitable habitat is potentially present along the Study corridor.
Fish	Previous survey reports included desk study records of notable fish species in the River Tone, including brook lamprey (*Lampetra planeri*), brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*), bullhead (*Cottus gobio*) and stone loach (*Barbatula barbatula*). It is unlikely that significant populations of notable migratory fish species would be present within the Westford Stream, due to the presence of artificial structures presenting a barrier to movement.
Other notable species	Previous survey reports included desk study records of harvest mouse (*Micromys minutus*), brown hare (*Lepus europaeus*) and four waxcap species (*Hygrocybe* spp.). Suitable habitat for these species is present along the length of the Study corridor.
INNS	Previous surveys identified the presence of Himalayan balsam on the Tone Works site, and also included a desk study record of Japanese knotweed (*Reynoutria japonica*). Himalayan balsam was identified in stands along Westford Stream and on the River Tone around the Mill building. Further INNS may be present in areas not visited during the survey, or they may have been present in visited areas but not in flower at the time.

Overall, the area along the Study corridor appears to be biodiversity-rich, with several sensitive ecological receptors. Although the aim of this project is to benefit the environment and biodiversity, ecological receptors may nevertheless be impacted during implementation of any final option.

As described above, when options have been refined and/or selected, affected areas will likely require a full UK Hab survey and BNG assessment to inform design and the requirement for additional Phase 2 surveys. Specific mitigation and avoidance measures, including Natural England development licences for protected species, and best practice construction methodologies may be required in order to ensure legal compliance.

Project design should retain and enhance complex habitat mosaics which support and provide connectivity for the described species, with a specific focus on those that are rarer or localised (such as those mentioned in the Wellington Basin LNR or Langford Heathfield SSSI citation[23]). Based on the ecological desk study and field survey, there are specific opportunities for enhancement which could be explored within the Options Appraisal stage to secure wider benefits for the Tonedale environment and community (see Appendix 2).

3.5 Climate Change

3.5.1 Climate

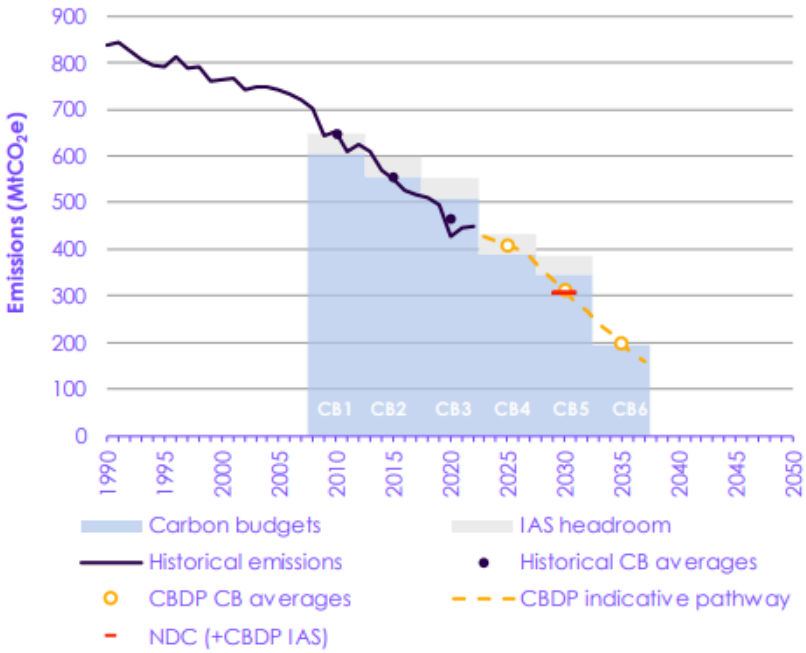
In 2015 the 21st UN Climate Change Conference was held in Paris. At this conference the Paris Agreement was agreed and adopted by 196 countries, including the UK. The Paris Agreement is a legally binding international treaty on climate change. Its overarching goal is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels. In response to this, the UK Government, and devolved Welsh Government, committed to a legally binding target of 80% reduction in carbon emissions relative to the levels in 1990, to be achieved by 2050. In June 2019, secondary legislation was passed that extended that target to "at least 100%".

Somerset Local Authority has a Climate Emergency Strategy, which was agreed by all five former local authorities. The aim of this strategy is to reduce carbon emissions in the county and make Somerset a county resilient to the

inevitable effects of climate change. The strategy includes the goal to become a carbon-neutral county by 2030 and also outlines how Somerset Council intends to address the most important issues around the Climate and Ecological Emergency.

3.5.2 Carbon Emissions

UK GHG emissions have been steadily falling in the UK over the past three decades and in 2022 were 46% below 1990 levels. The UK has set out its carbon reduction obligations within Carbon Budgets that run over five-year periods. The UK met its first two carbon budgets and is likely to have met its third, which ran from 2018 to 2022. Using the provisional estimate for 2022 emissions, total emissions over the Third Carbon Budget period were 2,327 MtCO2e. The historic UK GHG emissions data and projected carbon emissions, in context of current carbon budgets, are shown below in Figure 12.



Source: DESNZ (2023) *Carbon Budget Delivery Plan*; BEIS (2021) *Net Zero Strategy*; CCC (2020) *The Sixth Carbon Budget*.
Notes: (1) Emissions from international aviation and shipping (IAS) are included in historical emissions and the Carbon Budget Delivery Plan (CBDP) pathway and added to the NDC to allow for a direct comparison. (2) The CBDP projections include only the quantified plans. Unquantified plans may lead to further emissions reductions. (3) The annual pathway is an indication of emissions reduction. The UK does not have annual targets but the five-year carbon budgets and 2030 NDC must be achieved. (4) We have adjusted the Government's published CBDP pathway for land use to account for methodological changes between the 1990-2019 and 1990-2020 inventories.

Figure 12: Historic and future GHG emissions data and projections for the UK

3.5.3 Future Climate

The United Kingdom Climate Projections 18 (UKCP18) uses climate science to provide updated observations and climate change projections out to 2100 in the UK and globally [37]. The UKCP18 projections are broken into four Representative Concentration Pathways (RCPs) and represent progressively

[37] Met Office (2022) UK Climate Projections: Headline Findings. https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v4_aug22.pdf. (Accessed: 27/09/23)

worse warming scenarios. RCP2.6 represents a pathway where greenhouse gas emissions are strongly reduced, resulting in a best estimate global average temperature rise of 1.6°C by 2100 compared to the preindustrial period. RCP8.5 is a pathway where greenhouse gas emissions continue to grow unmitigated, leading to a best estimate global average temperature rise of 4.3°C by 2100. All of the UKCP18 climate projections for the UK show trends of increased chance of warmer, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extremes.

In UKCP18, the probabilistic projections provide local low, central and high changes across the UK, corresponding to 10%, 50% and 90% probability levels. These can be broken down to the specific regions within the UK.

The probabilistic average changes within Wellington (including Tonedale) are shown in the table below. Temperatures in the area are projected to increase in both winter and summer. The largest increase is projected to be in the mean daily maximum temperature in summer, which is expected to increase by 3.3°C to 18.8°C in the time-period 2049-2079, relative to the baseline in the high emissions scenario.

Mean precipitation rates in the region are anticipated to change significantly throughout the century, increasing by 6.9% - 13.4% in the winter and decreasing by 9.1% - 27.4% in summer during the time periods 2019-2049 and 2049-2079[38].

The tables also present changes in extreme weather events for the 2020 to 2079, such as number of days with low or high precipitation or heatwaves (days above 26°C)

The mean number of hot days, when the maximum temperature in above 26°C, is anticipated to increase from 3.8 to 39.6 days per year in the time-period 2050-2080 for the high emissions scenario relative to the baseline. The number of dry days are also set to increase from 113.2 to 134.3 in 2050-2080.

[38] Met Office (2022) Climate change projections over land. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/climate-change-projections-over-land

Table 3: UKCP18 Probabilistic (Average Trends)

		2019-2049			2049-2079		
	1980-2010	10th Percentile Result	50th Percentile Result	90th Percentile Result	10th Percentile Result	50th Percentile Result	90th Percentile Result
Change in Average summer temperature (ºC)	15.5	15.9	16.8	17.7	16.8	18.8	20.7
Change in Average winter temperature (ºC)	4.9	5	5.7	6.5	5.5	6.8	8.2
Change in Average summer precipitation (mm/day)	2.1	1.5	1.9	2.3	1.0	1.5	2.1
Change in Average winter precipitation (mm/day)	3.4	3.3	3.6	4.0	3.3	3.9	4.5

Table 4: UKCP18 High Resolution Projections (Extremes)

		2020-2050			2050-2080		
	1980-2010	10th Percentile Result	50th Percentile Result	90th Percentile Result	10th Percentile Result	50th Percentile Result	90th Percentile Result
Change in Temperature threshold more than (25.0) (days per year)	3.8	7.7	13.5	31.6	19.6	39.6	63.4
Change in Precipitation threshold less than (0.02) (days per year)	113.2	115.6	121.6	130.6	125.8	134.3	149.4
Change in Precipitation threshold more than (20.0) (days per year)	6	5.7	6.1	6.9	5.9	6.5	8.1

3.5.4 Renewable Energy

The UK government's 2019 announcement of a net zero target for UK (Climate Change Act 2008 (2050 Target Amendment) Order 2019) for greenhouse gas (GHG) emissions by 2050 has significant implications for the UKs energy systems and the need for decarbonisation. Together, Somerset Council's response to this target (section 3.5.1), alongside the developing

Local Area Energy Plans and retrofitting efforts (Somerset Housing Strategy)[39], will begin to play a role in achieving the 2030 net zero target. To support this goal, further reductions in carbon emissions across the county are necessary whether be through the decarbonisation of existing assets or through the development of alternative energy generation technologies.

Technologies with low to zero carbon emissions (Table 5) are vital to support Somerset Council meeting their target, and specifically, there may be opportunities for the Tonedale and wider Wellington community to improve their resilience to climate change disruptions. There are key heritage sites and waterways within the Tonedale area which do present opportunities for renewable energy generation but need to be carefully assessed. Renewable energy opportunities pose challenges for the conservation and management of heritage sites, which have outstanding cultural and natural value that requires preservation or restoration. The following challenges and needs require consideration when assessing low and zero carbon energy sources for sensitive heritage sites:

- Suitability and local energy needs;
- Carbon Reduction Benefits;
- Potential Savings vs whole-life energy costs;
- Technology fitting without impacting historic fabric;
- Visual impact; and
- Permitting and Planning controls.

There may be other technologies that can be used but those will be subject to an appraisal of suitability relative to site condition and the practicality of its application. The subsequent options development and appraisal process will determine the scope of which technologies are investigated for their feasibility.

Table 5. Common and potential Renewable Energy Technologies and consideration which may be explored, subject to feasibility.

No.	Technology	Influenced by	Considerations	
1	Solar Photovoltaic	Location	Structural	Can the existing structure carry the solar PV array?
		Shading	Electrical	How much power is produced?
		Local Environment	Operations and Maintenance	Any maintenance required? e.g. Cleaning of Panels brought about by snow or dust? How might access to panels be achieved?
		Weather	Power Conversion	DC Losses dictated by the positioning the Inverter.
2	Solar Water Heating	Location	Structural	Can the existing structure carry the solar absorbing tubes plus its fluid?
		Shading	Electrical	How much heat is produced is reduced as compared to present system?
		Local Environment	Operations and Maintenance	Any maintenance required? e.g. Cleaning of Panels brought about by snow or dust?

[39] Somerset Council. Somerset Housing strategy 2019-2023. Priorities and Ambitions for Homes and Housing in Somerset.

No.	Technology	Influenced by	Considerations	
		Weather	Ambient conditions can have an influence on the temperature water produced.	When heat is needed, can the system produce the requirement all year round?
3	Heat Pumps	Ambient Air Conditions	Aesthetic positioning	Where can it be located with minimal impact in appearance?
		Local Environment	Power usage	Are there appropriate heating loads for heat pumps to be economical?
4	Wind Turbines	Location and siting	Structural	How to hold the Wind turbines in position where wind is most consistent?
		Historical Wind data	Aesthetic positioning	Where can it be located with minimal impact in appearance?
		Terrain wind data	Safety	In the event of a strong winds, any risk of the equipment or its components falling?
5	Hydroelectric Power	Water Volume Flowrate and patterns.	Structural	Weir construction, Water diversion to turbine.
		Elevation (Head)	Maintenance	Clearing screens from captured debris.
		Local infrastructure	Existing Watermills	Application to existing mill wheels.
6	Biomass Boilers	Availability of Wood Chips	Emissions	Air Quality needs to be monitored and balanced with the existing trees by managing the planting and regrowth.

3.6 Historic Environment

The historic environment baseline uses a study area which encompasses likely areas where proposed works/actions may take place as this scheme is in early stages, and no specific red line project boundary is defined, just an area of interest which we have designed a study corridor around (Figure 13).

The area of interest covers the Tone Mill and dye works with its surroundings and extends all the way to Tonedale Mills complex to the south, along the back stream. The River Tone crosses the Tone Mill property, where the back stream starts and flows down to Tonedale Mills forming a water management system with basins, weirs and sluices with gates that used to serve the historic mills.

The scope of this chapter is to develop an understanding of the cultural heritage baseline, including known designated and non-designated heritage assets, historic landscape character and archaeological potential, sufficient to inform the design options and feasibility study.

All available baseline data was collected from an area of interest of 250 m buffered from the study corridor, identified as the area of potential options. A holistic approach was taken to identify those designated heritage assets which have the potential to be impacted by the scheme, including changes to their setting outside the 250 m study area. At a minimum, all Grade I and II* listed buildings and registered parks and gardens were included up to 500 m.

The following sources have informed the appraisal:

- National Heritage List for England (NHLE) – Historic England's dataset of designated heritage assets (including Scheduled Monuments and Listed Buildings);
- The Somerset Historic Environment Record (SHER);
- Geological data from the British Geological Survey (BGS);
- Unpublished grey literature from the Archaeological Data Service (ADS).
- English Heritage Extensive Urban Survey (EHEUS) *Archaeological Assessment of Wellington*

Designated heritage assets within the study area, or outside the study area but with wider setting, are listed in table 4 below. A gazetteer of non-designated heritage assets identified within the study area are in Appendix 4. Designated heritage assets are referred to using their NHLE ID, while non-designated heritage assets identified from the HER are referred to by their Monument ID. Best practice guidance and policies used to develop this baseline are set out in the Appendix 3.

3.6.1 Archaeological and Historical Background

Designated and non-designated heritage assets

The designated heritage assets within the study area include:

- 15 Listed buildings (3 of which are Grade II* and 12 are Grade II) and a grade II* asset registered as Park and Garden.

There are no scheduled monuments located within the baseline study area.

The Wellington Conservation Area is outside of the immediate study area, however, any proposed works should be reviewed in relation to the town centre as part of a holistic approach. It is also on Historic England's Heritage at Risk register. Similar, the Wellington Park which is grade II* listed, sits in the vicinity of the study area but potential impacts from proposed works on its setting should also be considered.

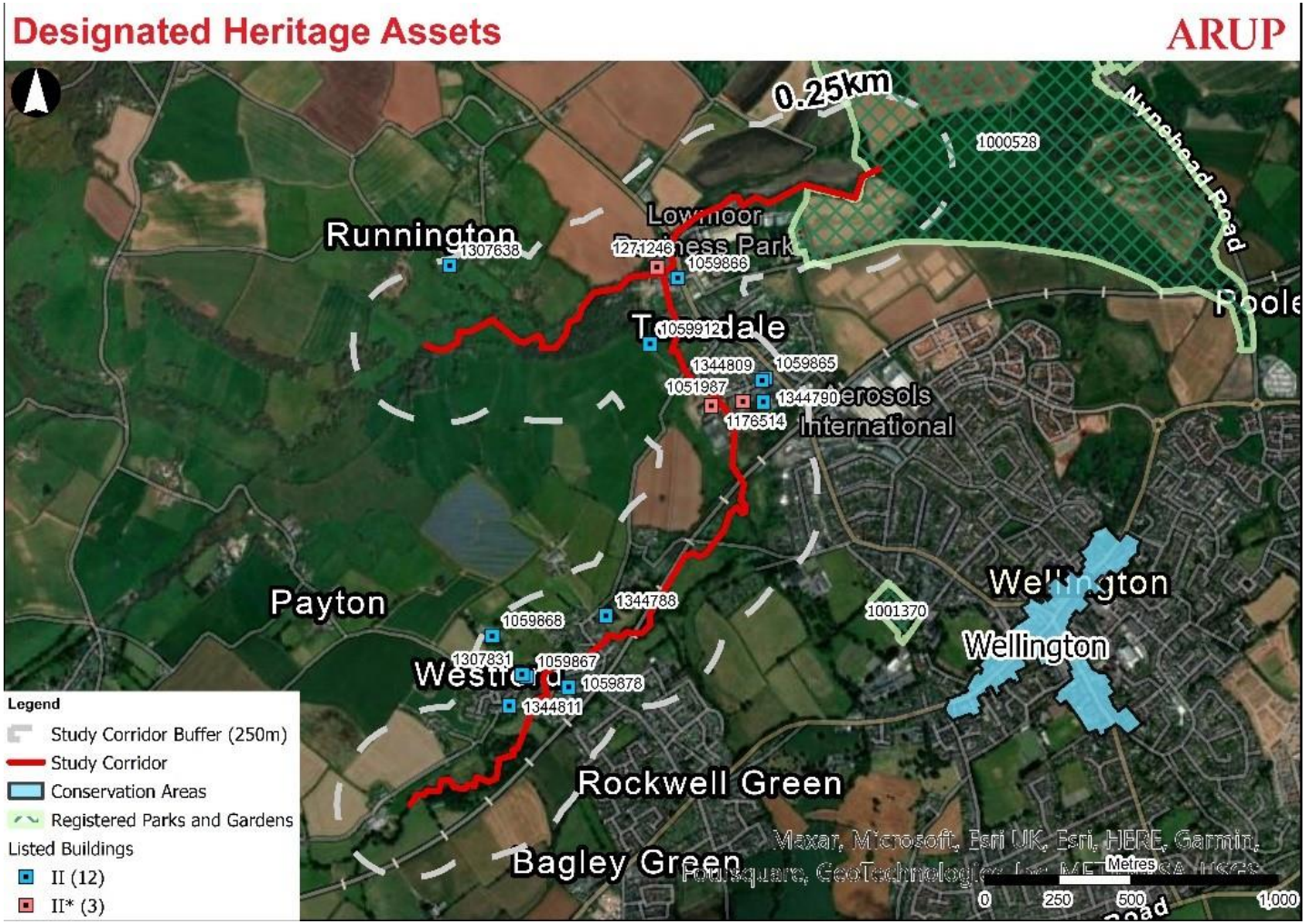


Figure 13: Designated Heritage Assets

There are 26 records for archaeological remains and other non-designated heritage assets that have been identified within the study area by the SHER, filtered to remove duplicates and data relating to designated assets.

Geological Background for Archaeological Potential

The BGS notes that the indicative geology of the study area comprises channels of alluvium and colluvium within the footprint of the present-day water course. Within the area of Tonedale, these superficial deposits of alluvium overly Helsby Sandstone Formation which makes up the bedrock geology. Colluvium and Alluvium overly Aylesbeare Mudstone in the west. The presence of alluvium may suggest the preservation of particular material culture such as organic remains. Additionally, alluvial deposits may be of geoarchaeological interest as palaeoenvironmental evidence may be present.

Historic Landscape Characterisation

The SHER notes that the area to the east of the confluence of the river Tone and the upstream section of Westford Stream, known as Back Stream, is characterised by two intensive industrial areas, containing the Tonedale Mills and other listed industrial buildings (NHLE 1176514; 1051987; 1059866; & 1271246), as well as footprint of the expanded settlement of Tonedale and Wellington 'post Tithe maps' (c. 1840).

The downstream area of Westford Stream is characterised by enclosed land configured since the 18th century with fields varying in size up to 3ha and water treatment works.

The area to the west of Westford Stream and the west section of the study area around the river Tone is characterised by 'ancient' enclosed agricultural land, likely modified in the 17th to 19th centuries, with field systems varying in size from 3ha – 12ha.

The east section of the study area around the river Tone is characterised by a historic landscape park as defined by the Grade II* Nynehead Court registered park and gardens (NHLE 1000528).

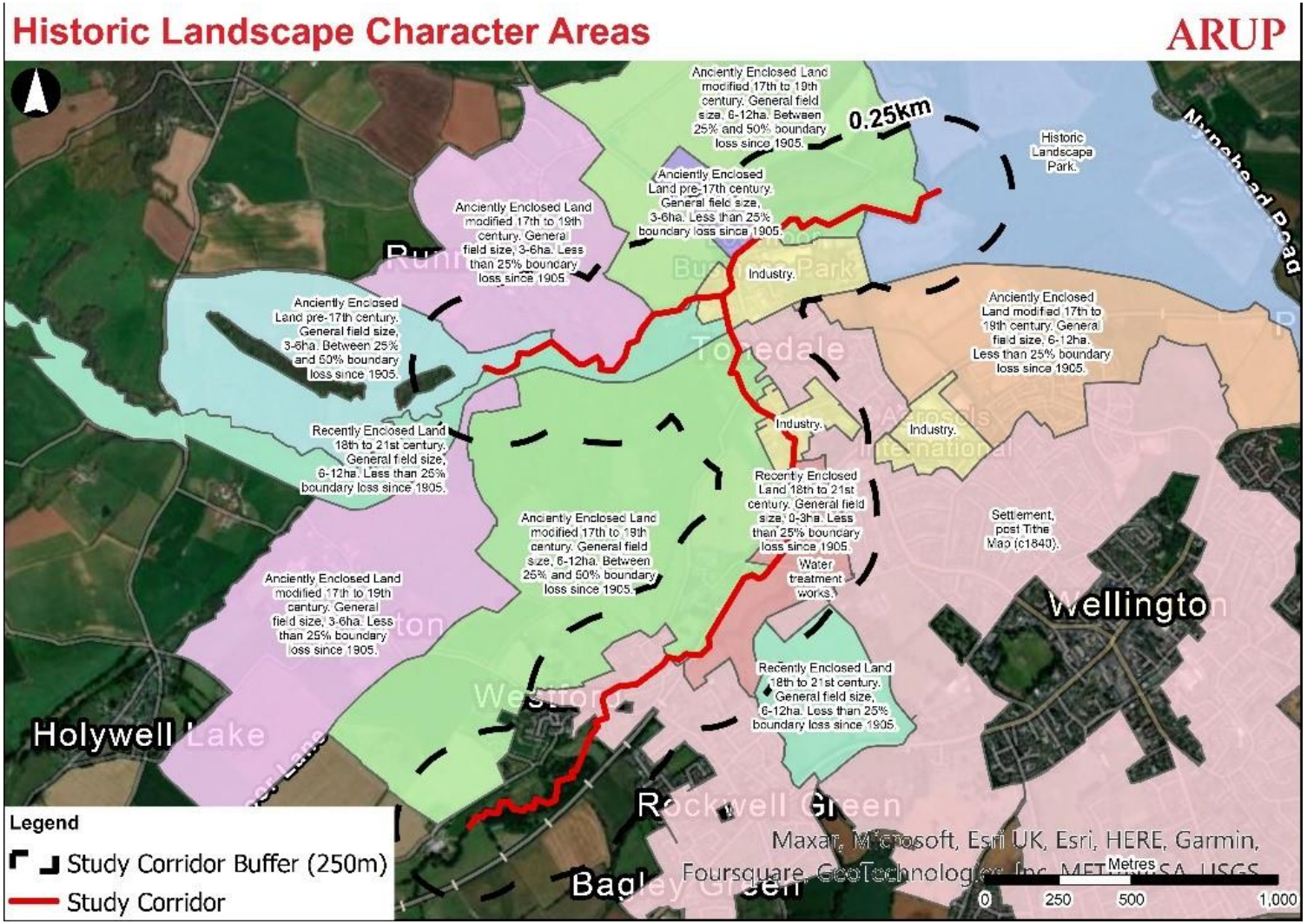


Figure 14: Historic Landscape Character Areas

Archaeological Baseline Summary

The SHER notes that three previous investigations have been undertaken within the study area. These investigations were all undertaken within the vicinity of the Tonedale Mills and Tone Works, comprising a Ground Penetrating Radar (GPR) survey (PRN 47259), a watching brief and building recording (PRN 32691), and an archaeological excavation (PRN 16088). Consequently, survey-based assessment of archaeological potential for the study area as a whole is limited.

Figure 15: Previous Archaeological Investigations

There are three buried heritage assets recorded within the SHER that may be of Prehistoric, specifically Bronze Age (2600 BC- 800 BC) or Iron Age (800 BC – AD 43), or Roman (AD 43 – AD 410) date. These comprise two large cropmark enclosures, located 30m (PRN 42683) and 200m (PRN 42682) north of the course of the river Tone respectively. A third cropmark enclosure (PRN 41167) was recorded approximately 250m south of the course of the river Tone. All three assets were identified through aerial photography desk-based study.

No Early Medieval (AD 410 – AD 1066) or Medieval (AD 1066 – AD 1538) period heritage assets have been identified by the SHER.

There are 24 non-designated assets recorded from the post-Medieval period (AD 1538 – AD 1901). These assets are predominately 18th and 19th century in origin and mostly reflect the industrial activity that characterised the Tonedale area. Heritage assets of the 18th century include the turnpike road leading from Milverton to Tone Bridge (PRN 26235), lime kilns (PRN 37402; 43267), and the Grand Western Canal (PRN 44126). The limekilns of the late 18th century are thought to have provided materials for the construction of the canal system which continued construction into the 19th century. Heritage assets of the 19th century comprised mill buildings (PRN 46330), a sawmill (PRN 43719), the site of a loomshop (PRN 41446), and the site of a grease refinery (PRN 19940). Other assets include ornamental canalisation of the river Tone, in the east area of the study, within the Nynehead Park area (PRN 39878), as well as a boat house (PRN 39880) and weir (PRN 39879) in the Nynehead Park area.

To ensure an adequate and constant water flow to support the five Tonedale mills in the upstream section of Westford Stream, a system of watercourses, culverts, sluices, and weirs known as 'The Basins' (PRN 36840) were constructed between 1801 – 1803.

The Bristol and Exeter Railway was constructed in the 1840s (PRN 12964). Wellington became a stop along the line with the construction of the Wellington railway Station in 1843 (PRN 14660). This coincided with the expansion of local population and the industrial activity within Tonedale.

Two non-designated heritage assets of the Modern period (AD 1901 – Present Day) are recorded by the SHER. These include the Tone Bridge (PRN 45203), which was built in 1914, and rebuilt Wellington railway station (PRN 14660) dating from1943.

The Wellington Archaeological Assessment (EHEUS) notes that the successive development of the settlement of Wellington has been restricted

from the Medieval period until the industrial expansion of the 19th century. Despite this, the confluence of the two water courses may have been a favourable resource to exploit throughout the past. Additionally, as the landscape characterisation above shows, much of the study area within the vicinity of the water courses remains open agricultural land which is unlikely to have been affected by previous development. While investigation information is highly limited, it may be supposed that there is a high potential for encountering archaeological remains of at least local interest from all periods.

It is likely that 19th century landscaping works such as the construction of the water basins (PRN 36840) and the Grand Western Canal (PRN 44126), removed any potential underlying archaeological remains within their respective footprints.

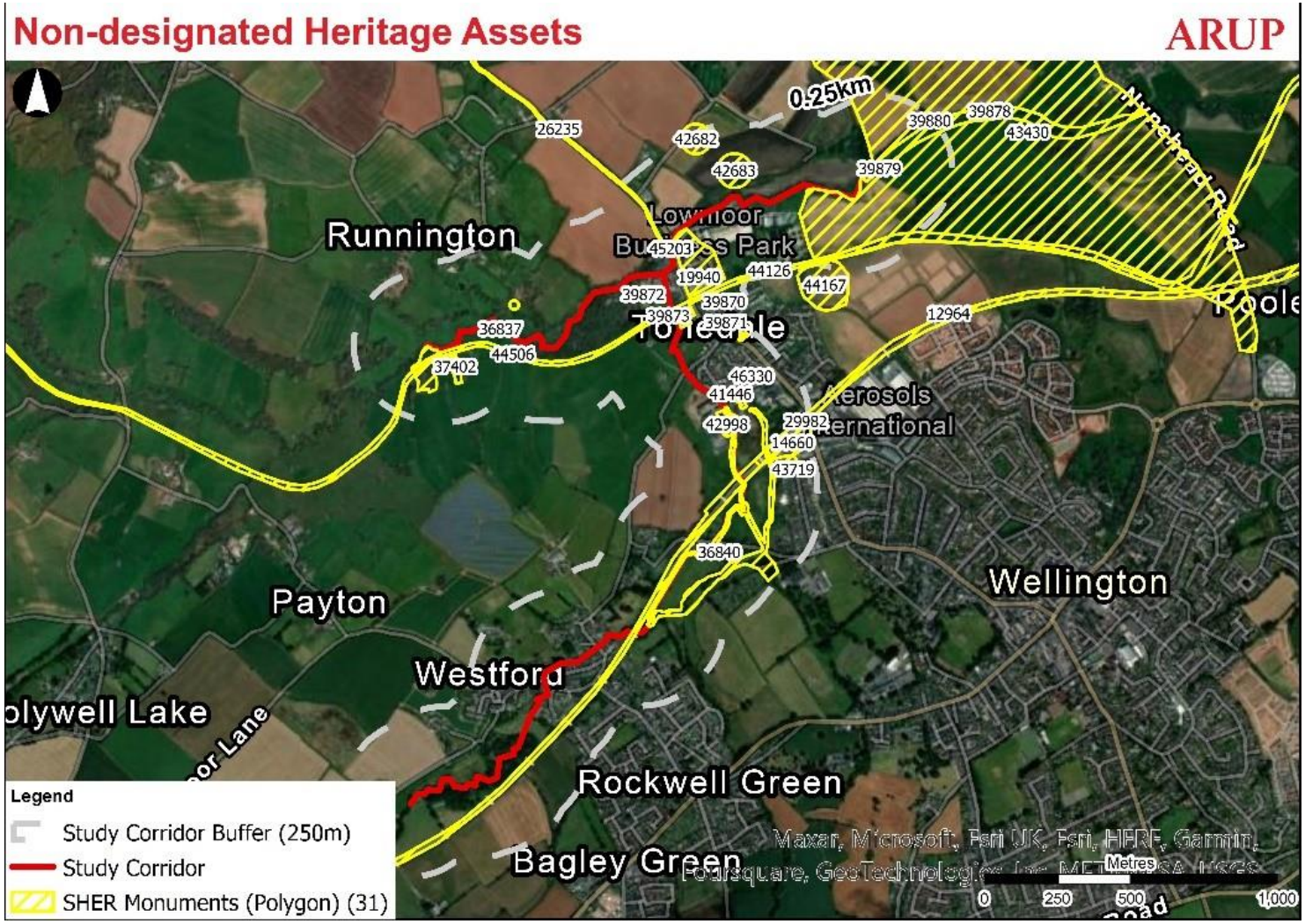


Figure 16: Non-designated Heritage Assets

3.6.2 Overview of significance of built heritage assets

Given the early stage of this scheme this section is relatively high-level, intended as a guide to particular sensitivity rather than a comprehensive assessment of the significance of potentially impacted heritage assets.

Heritage assets potentially impacted by the scheme are first identified, before a description is made of their significance and an assessment made of the potential harm which could arise from the scheme.

Harm can arise from physical changes to a heritage asset or from changes to its setting, impacting the contribution made by its setting to its significance. See Table 6 for a summary of the key built heritage assets which could be impacted by the proposed scheme.

Table 6: Key built heritage assets.

Name	Heritage At Risk Register	Listing	Category	List Entry
Cloth Finishing Works At Tone Mills North Range Including Dyehouse And Reservoirs	Heritage At Risk	Grade II*	Listed Building	1271246
Cloth Finishing Works At Tone Mills South Range		Grade II	Listed Building	1059866
Nynehead Court		Grade II*	Park And Garden	1000528
Five Houses		Grade II	Listed Building	1059912
Tonedale Mills (East Complex)	Heritage At Risk	Grade II*	Listed Building	1176514
Tonedale Mills (West Complex)	Heritage At Risk	Grade II*	Listed Building	1051987
Tonedale Farmhouse		Grade II	Listed Building	1059865
Outbuildings attached to west side of Tonedale Farmhouse		Grade II	Listed Building	1344809

Name	Heritage At Risk Register	Listing	Category	List Entry
Tonedale House		Grade II	Listed Building	1344790
The Manse Westford House		Grade II	Listed Building	1344811
Linden Cottage		Grade II	Listed Building	1344788
Westford Pumping Station		Grade II	Listed Building	1059878
Westford Court		Grade II	Listed Building	1059867
Westford Court		Grade II	Listed Building	1307831
Westford House		Grade II	Listed Building	1059868
Runnington House		Grade II	Listed Building	1307638
Wellington Conservation Area	Heritage At Risk Not within the study area, but linked with other designated sites in terms of historical development		Conservation Area	
Wellington Park	Wellington Park Not within the study area, but in the vicinity. It is included due to its listing grade and potentially wider setting which might be impacted.	Grade II*	Park And Garden	1001370

3.6.3 Key assets for consideration in options development

Cloth finishing works at tone mills north range including dyehouse and reservoirs (Grade II*, NHLE: 1271246) and Cloth Finishing Works at Tone Mills South Range (Grade II listed, NHLE: 1059866)

Tone Works was the dyeing and finishing works established by Fox Brothers and Co of Tonedale Mills, Wellington, at the confluence of the River Tone and the Back Stream. The site is shown on the Tithe map of 1839, and the works was enlarged and altered over the next 80 years. The earliest surviving structures dating from c1830-1839 are the North Dry House, the South Dry House and the Wheel Chamber. The rest of the buildings are a combination of structures developed during the late 19th century, with the White and Grey Goods Buildings only added in the mid-20th century.

In 1912 the site was described as having "perhaps the largest Indigo Dye House in England". The site continued to operate until the 1990's.

A site plan was developed to the north and south of a bend in the River Tone, from which water for processing was drawn and treated in a reservoir to the west of the factory. The supply of water determined the layout of the north and south ranges which are grade II* and grade II listed respectively. The complex is comprised of a reservoir and sluice gates, a dyehouse complex, a finishing works with engine house and integral water wheel chamber, and 2 boiler houses. The buildings are constructed of rubble stone and red brickwork, with slated and glazed roof coverings.

Tone Works is a near-complete example of a C19 cloth dyeing and finishing works, which developed between c.1830 and c.1920. It retains all the component structures associated with the dyeing and finishing of worsted and woollen cloths, together with the machinery and fittings required for those processes. Most significant is the water wheel which powered the earliest structures, with a sluice and a weir directing the water towards the water wheel chamber. In the late 19th century, the water management systems were adapted with new weirs and sluices to redirect river towards the steam plant built on reclaimed land. In the early 20th century, the power system was updated to electric, with the powerhouse using an existing line shaft system, rare to be found intact.

Tone Works in its present form is an exceptional survival in a national context, not only for the completeness of the building complex, but also for the survival of its machinery, water management system and power generation plant. The north range is in poor condition and on the Heritage at Risk Register.

Tonedale Mills (NHLE: 1051987, NHLE: 1176514 and NHLE:1344790)

The surviving buildings at Tonedale Mills are covered by three list entries: one for Tonedale House (Grade II, NHLE:1344790) and one each for the west complex (Grade II*, NHLE: 1051987) and the east complex (Grade II*, NHLE: 1176514).

The complex is an integrated multi-component wool textile factory in Wellington, Somerset, with buildings dating from the 19th and 20th centuries. It was the headquarters of Fox Brothers, one of the most successful and longest-lasting textile firms in the country. The extensive wool textile manufacturing site at Tonedale Mills is divided by a water course, the Back Stream, in eastern and western parts.

Tonedale Mills developed in numerous phases which can be grouped by function and chronology. The first group comprises buildings that were erected between 1801 and 1839, of which most now form part of block H. From the mid-19th century onwards, a second group, comprising weaving sheds and several engine houses were added to the north of the loomshop in several phases. The third group comprises the five-storey spinning mill (building A), which was built in two phases and included a large central engine house with a double beam engine. A fourth group (buildings within block F and G) comprised a power house, boiler house, fire station, maintenance facilities, and wool-scouring sheds. Offices and board rooms (buildings in block J) were added in the late 19th and early 20th centuries in several phases. Buildings (in block J) used for cloth-finishing, inspection, cutting and pressing were also built in several phases, from the late 19th to the early 20th century. In the south-west corner of the site, two two-storeyed

spinning mills (blocks B and C) were built in the 1880s. A large carding and spinning shed (buildings in block D) was built in two phases between 1902 and 1905. Also in the early 20th century, a group of single-storey buildings (buildings in block E) was built to the east of block D. They included the brick-built gas engine and electric generating house, which probably powered blocks B, C and D.

Tonedale Mills has been recommended for conservation area designation, as per the rapid review produced by the South West Heritage Trust in 2018. The suggested boundaries extend beyond the site of Tonedale Works, towards the south with potential extensions to include the area around the back stream and Linder house, as well as a marginal extension to include Coram's Lane. Recommendations for conservation area designation were also made for Station Road and Wellington Park, south of the back stream.

According to the condition survey produced by Jubb Clews in 2020, the key physical risks to the buildings are rainwater ingress and poor site management. Water ingress is affecting the structure, particularly the roof frame, walls and floors. Water ingress is also causing the historic interiors to deteriorate. Poor site management has resulted in damage to the buildings during instances of unauthorised access (manifesting in criminal damage, theft of building components, and arson).

Tonedale Mills is thought to be the largest and most comprehensively representative textile manufacturing site in the south-west, with a range of surviving structures unparalleled in England. Both the west and east complex are on the Heritage at Risk Register.

Built Heritage Summary

Heritage opportunities and risks to be identified and fed into the design options.

Potential impact to be reviewed at high level, following a high-level assessment of significance of designated assets above.

Water Management System to be considered in terms of heritage protection. Pre-existing waterwheel pits, and potentially other features, became part of the reconfigured system. Tonedale Mill's extensive and complex water management system secured a reliable flow of water to the mill, taking into consideration the seasonal fluctuations in stream levels and the activities of the mills upstream. Fundamental layouts of the water management system haven't been altered significantly, only developed through new diversions, while some features were culverted beneath buildings and yards. The individual components of the systems at Tonedale Mill and Tone Works are not particularly rare, although the water management system as a whole is an important survival. While many of the buildings at Tone Works and Tonedale Mill are listed, the water management features beyond the buildings have no statutory protection; this is despite the water management system at Tonedale pre-dating the factories' construction.

3.7 Landscape

3.7.1 Description of the landscape

The sites of Tonedale Mill and Tone Works are characterised by their proximity to Wellington's urban fringe. Tone Works sits along the River Tone and Tonedale Mill within the wider associated floodplain. The Tone floodplain is flanked by areas of wet meadow and well wooded margins, appearing in some areas open and other areas enclosed.

The wider landscape within the study area hosts numerous waterways including the Westford Stream and Rockwell Stream, which are tributaries to the River Tone. There are also man-made leats and balancing ponds originally constructed to provide power to Tonedale Mill and Tone Works. Numerous footpaths follow these waterways and capture the heritage assets including weirs, sluice gates and characterful bridges.

Along the river corridor the floodplain is flat but quickly moves to an undulating landscape. Fields are medium sized and irregular in shape. These are predominantly grazed but with some arable cropping and solar farm. The wooded escarpment of the Blackdown Hills is a prominent back drop. Tributaries run off the Blackdown Hills cutting their courses through the landscape, creating an undulating terrain. The A38 (aprox. 0.8km south of the

study area) and the railway line (within the study area) dissect the landscape, interrupting the landscapes pattern.

3.7.2 Landscape designations

Landscape designations for the area of interest are shown in Figure 17.

Tonedale Mill and Tone Works both sit on the western edge of Wellington and outside of the Wellington conservation area which lies approximately 1.18km southeast of Tonedale Mill.

The settlement of Wellington occupies an attractive setting at the foot of the Blackdown Hills Area of Outstanding Natural Beauty (AONB) which is approximately 1.8km south of the study area. An important vista from Wellington Monument (National Trust) in the Blackdown Hills emphasises the study areas pastoral character. Approximately 11km north-east of the study area is the Quantock Hills AONB. Both the Blackdown Hills and Quantock Hills are designated at a national level.

Within the study area itself there are local designations including Nynehead Court which is situated along the River Tone, approximately 0.4km east of Tone Works and is characterised by its pleasure gardens and parkland character. Wellington Park is situated 0.7km south of Tonedale Mill. Both of which are registered Parks and Gardens, open to the public.

Close to Wellington Park is the Wellington Basins which is a registered local nature reserve (LNR). As well as its wildlife interest it also provides recreational value with boardwalks and seating areas.

A long-distance footpath called the Two Counties Way which joins the Grand Western Canal National Trail at Greenham, runs close to The Tone Works. It follows the route of the remnant section of the Grand Western Canal north of the town.

3.7.3 Summary of national landscape characteristics

National Character Area profiles contain descriptions of a landscape area. Wellington sits within the National Character Area profile 146: Vale of Taunton and Quantock Fringes. Within this area there is considerable variety, united by its lowland mixed farming landscape, with dense hedges, sparse woodland, red soils and settlement pattern. Wellington sits in the low-lying Tone Valley – a flat, open landscape with similar character to the nearby Somerset Levels. There are strong visual links to the wooded Blackdown Hills AONB to the south.

The National Character Area profile also provides Statements of Environmental Opportunities (SEO) which give suggestions where action can be best targeted to conserve and improve the natural environment. SEO's relevant to this project include:

SEO 2: *'Create and enhance connecting corridors of hedgerows...small woodlands, and hedgerow and riverside trees. Promote connecting corridor linkage with the Blackdown Hills, Exmoor and Quantock Hills, e.g. by managing, restoring, and creating areas of traditional orchard and parkland...for the benefits that the habitats will bring in managing soil erosion and water quality and flow, and maintained character.'*[40]

SEO 3: *'Protect the historic environment...engaging both visitors and local communities in understanding how the interaction of human and natural factors has shaped the farmed landscape of today, e.g. by promoting access for all to the natural environment ... and making the most of natural, historical, inspirational and tranquil places."* And *"promoting, through engagement, people's understanding of the combined effect that multiple*

[40] Natural England. 07 April 2014. *National Character Area profile: 146. Vale of Taunton and Quantock Fringes.* Available [online] at: NCA Profile:146. Vale of Taunton and Quantock Fringes - NE550 (naturalengland.org.uk) accessed 31 October 2023

historic features...have on landscape character and the importance of their conservation and presentation.'[41]

SEO 4: *'Safeguard and manage soil and water resources, notably the rivers Tone and Parrett, as part of the wider Somerset Levels and Moors priority catchment … working with naturally functioning hydrological processes to maintain water quality and regulate supply; reduce flooding; and manage land to reduce soil erosion and water pollution and to retain and capture carbon, e.g. by maintaining and restoring hedgerow boundaries that are characteristic of the area...Restoring and enhancing remnant wetland habitats, including coastal and flood plain grazing marsh and wet woodland... Creating grassland buffer strip verges running across slopes to provide a buffer to soil erosion and nutrient run-off in areas of arable production, including the catchment of the river Tone. Reinstate riverine habitats and connect rivers to their flood plains... to help to reduce flooding and increase water storage capacity.''* And "*Supporting the reversion to pasture of areas of arable land on slopes and adjacent to rivers, choosing locations according to opportunities to assist biodiversity adaptation to changes in climate and improvements in reducing sedimentation issues'*[42]

Attributes within the ecosystem services that contribute to cultural services (inspiration, education and recreation) include the rich pastoral landscape fringed by hills with a well wooded feel, and tree fringed rivers, along with the rich cultural heritage which provides a sense of place and tranquillity. Manors and associated parkland provide a sense of history. The existing network of footpaths provide recreation which is an important feature of the NCA.

Landscape opportunities include *'re-planting and restore orchards and parkland to re-enforce landscape and historic setting. Enhance interpretation of the many layers of historic evidence for educational and recreational purposes... Identify and realise opportunities to create new circular routes or links to existing rights of way, particularly around Taunton and Wellington and along major rivers'*[43]

3.7.4 Summary of local landscape characteristics

Prior to becoming part of the Somerset unitary authority from 1st April 2023, Wellington was part of the Somerset West and Taunton Council (SWT). Existing development plans for the former local planning authorities are relevant to the geographical area. In 2011 the Borough of Taunton Deane finalised their Landscape Character Assessment (LCA).

SWT use landscape types (LT) and character areas (CA) to summarise and appraise the landscape. LTs are distinct types of landscape with shared attributes and features that are generic in nature, occurring in different areas and in different parts of the country. CAs are the unique, individual geographical areas in which LTs occur. CAs are the finest unit of cohesive countryside character and have been used to understand the distinct character of the landscape within the study area and to understand the wider setting of Tonedale Mill and Tone Works.

Both Tonedale Mill and Tone Works are situated in CA 2a: The Tone which is characterised as a River Floodplain LT, and CA 3b: Blackdown Fringes which is a Farmed and Settled High Vale LT. Key characteristics of these character areas are described below:

Character Area 2a: The Tone

'This character area corresponds to the low-lying landscape surrounding the River Tone and is distinguished by its flat, lowland alluvial/river terrace floodplain that supports pasture and some arable farming. The character area covers a significant amount of the Borough – incorporating the floodplains of smaller tributary streams that feed into the main watercourse

[41] [25] [26] Natural England. 07 April 2014. *National Character Area profile: 146. Vale of Taunton and Quantock Fringes.* Available [online] at: NCA Profile:146. Vale of Taunton and Quantock Fringes - NE550 (naturalengland.org.uk) accessed 31 October 2023

of the River Tone. There is a strong physical and visual relationship with the surrounding Farmed and Settled High Vale.'[44]

'The River Tone (much of its course tightly meandering) is flanked by areas of wet meadow and by well-wooded margins containing typical riverside trees (willow, alder and poplar for example). The occurrence of willow – both individual trees and outcrops in hedges – is a key feature that distinguishes the Floodplain from the surrounding Vale.'[45]

Key characteristics:

- *'A low-lying, typically flat floodplain landform generally occurring between 5 and 50m AOD.*
- *Defined by the tributaries and main watercourse of the River Tone.*
- *Surface geology predominantly defined by Alluvium and River Terrace Deposits.*
- *Land use characterised by permanent pasture (with some cropping in places).*
- *Field enclosure pattern varying from ancient (modified 17th to 19th century) to modern (18th to 21st century). Hedgerows typically divide the fields.*
- *Very limited settlement within the rural areas (mainly individual farmsteads) but where the River Tone meets Wellington and Taunton, there is a very clear urban influence.*
- *Man-made infrastructure associated with transport and services – Great Western and West Somerset Railways, as well as prominent pylons carrying overhead cables.*
- *Riverbank and stream banks flanked by well –wooded margins containing species typical of a wet landscape –willow, poplar and alder.'*[46]

Character Area 3b: Blackdown Fringes

'This character area…defines the southern extent of the Vale of Taunton Deane – abutting the Wooded Escarpments of the Blackdown Hills AONB. The landscape extends to the west (beyond Wellington) where its boundary is defined by the River Tone Floodplain.' [47]

'Throughout the character area, small tributary streams cut a predominantly north-south course. Both running off the steep scarp of the Blackdowns as well as issuing from springs within the character area, these streams have cut their courses through the landscape, creating an undulating terrain. Streams crossing points are picked out by stone bridges.'[48]

Key characteristics:

- *'A transitional landscape defining the landscape between the Low Vale and the areas of distinctive higher ground e.g. Quantock Hills AONB and Blackdown Hills AONB.*
- *Undulating terrain formed where tributary streams have carved shallow depressions.*

[44] [28] [29] Somerset West and Taunton Council. 2011. *Taunton Deane Landscape Character Assessment.*

- *Varied underlying geology, reflected in the building stones of the different character areas.*
- *Elevation generally occurring between 50m AOD and 150m AOD.*
- *Rich agricultural landscape of arable cropping and pasture (dairying and stock rearing).*
- *Varied field size and shape.*
- *Overtly rural landscape in places with other areas having an urban fringe character (along major transport corridors and close to main settlements).'* [49]

3.7.5 Relevant local policy and guidance

Tonedale Mill and Tone works are sited on the western edge of Wellington at the urban fringe. The former SWT Council prepared a Wellington Place Plan (adopted 28 March 2023). The place plan has been adopted as a material consideration in considering conservation and regeneration activities in Wellington.

Two key areas of green space have been identified along the western edge of Wellington which include Fox's Field and land at the basins: collectively known as the green wedge. It is sited adjacent Tonedale Mill and provides a setting for the mill. Proposals for Fox's Field include the creation of a forest garden which includes a community orchard. This site is currently leased to Wellington Town Council. Proposals for land at Wellington Basins include expansion to the existing allotments, creation of a country park and conservation area, community garden and community sports.

The towns landscape setting and access to green space is an important part of its identity and attracting visitors.

Within the Wellington Place Plan, Tonedale Mill and Tone Works are identified as key heritage assets which contribute to the town's cultural heritage and identity. The aim is to return these derelict buildings to their original status (as industrial hearts of the community), transforming them into a mix of cultural, community and commercial users residential community.

Historic boundary treatments including stone walls, brick walls and wrought iron railings contribute significantly to the heritage and cohesive character of Wellington.

Furthermore, as part of the Place Plan community engagement was carried out. Findings concluded that:

'*Access to and provision of green and open space is very important to Wellington's community with many people identifying it as their favourite thing about the town.'*

'*People would like there to be a cohesive identity between the town and villages while maintaining green spaces as buffers between the settlements.'*

'The role of the Fox Family is important to the town's history including their influence on the Mill, rugby club, basins and homes built at the time. Promoting this heritage through way finding, heritage trails and other initiatives will help to celebrate the unique history of the town.'

'Easily accessible green spaces with walking and cycling routes through them are important to the community to encourage active travel.' [50]

Wellington Place Plan also sets out its vision and includes the following objectives:

- *'A town connected to its surrounding productive landscapes and craft heritage*

[30] [31] [49] Somerset West and Taunton Council. 2011. *Taunton Deane Landscape Character Assessment.*

[50] [34] [36] Somerset West and Taunton Council. Adopted March 2023. *Wellington Place Plan.* Available [online]: Wellington Place Plan (somerset.gov.uk) accessed 31 October 2023

- *A town which invests in its historic waterways to realise their character, and environmental and recreational benefits;* and
- *A town which protects and enhances its natural environment, ecological diversity and habitat continuity.'*[51]

Guidance to achieve these objectives include:

- *'Investment in historic footpaths to clear these and prevent them falling into disrepair and out of use, and to provide better signage and wayfinding. The same applies to woodland connections being improved. Links to the town centre, employment locations and out to the Blackdown Hills to be improved*
- *Improve walking routes and wayfinding for accessible connections from the town centre to PROWs and surrounding villages and hiking trails*
- *Explore the heritage, environmental, ecological, energy generation and amenity potential of the River Tone, its tributaries and infrastructure*
- *Take the opportunity to enhance the green infrastructure within neighbourhoods to strengthen the landscape character of the area and improve ecological networks*
- *Preserve and enhance the setting of Tonedale Mill and Tone Works and ensure that any future development does not compromise this*
- *Preserve the historic landscape of the Basins,* and
- *Preserve and respond to historic boundary treatments such as stone, brick walls and wrought iron railings.'*[52]

Furthermore, relevant guidance in The Somerset Levels & Moors Flood Action Plan emphasises the requirement for access for communities and businesses that is resilient in a flood event.[53]

Photographs from the landscape site visit are included below displaying features of interest and landscape character reflective of the area (Photograph 1 to Photograph 12.

[53] Somerset Rivers Authority. 2014. *Somerset 20-Year Flood Action Plan.* Available [online] at: Somerset 20-Year Flood Action Plan (somersetriverauthority.org.uk) accessed 08 November 2023

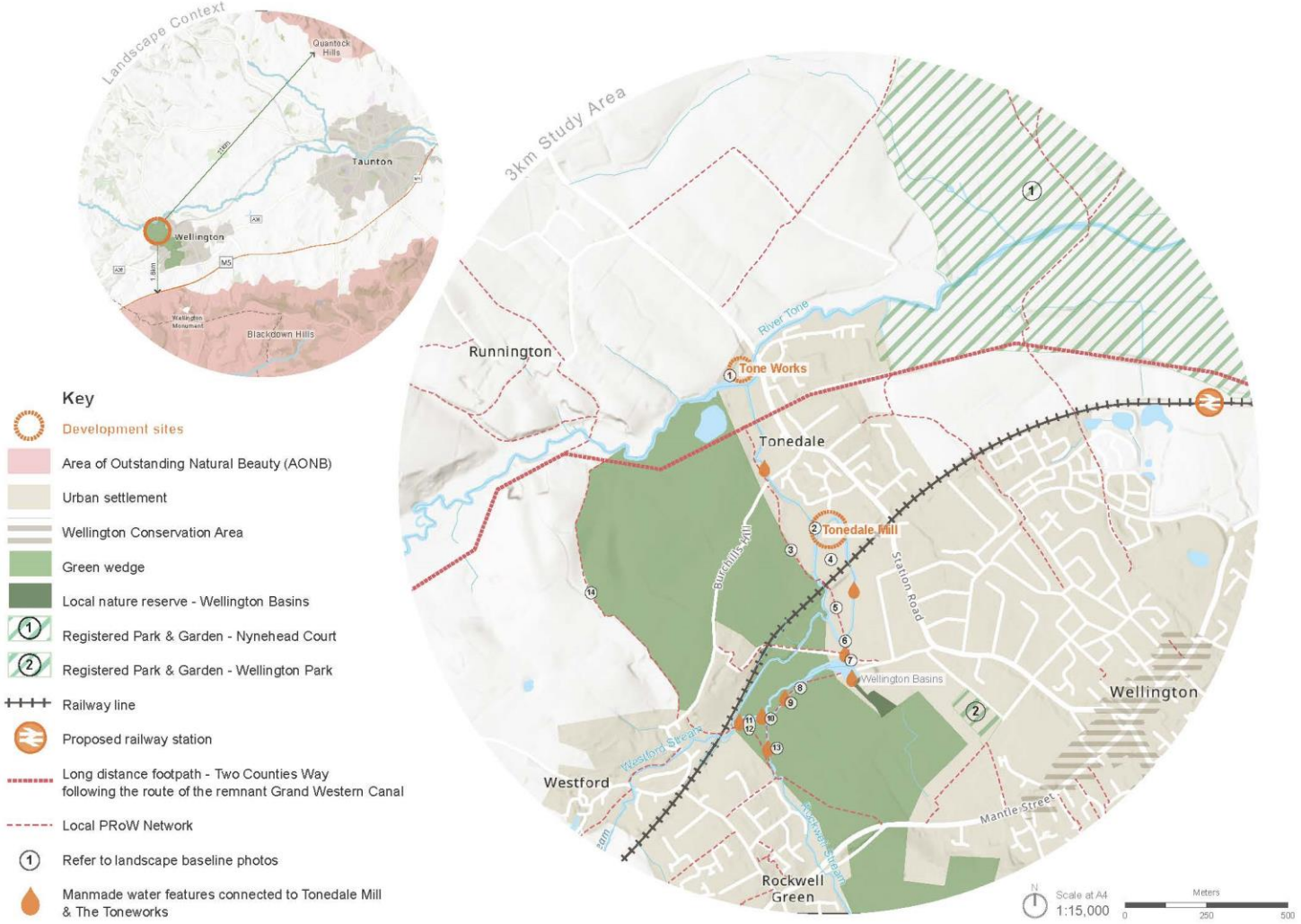


Figure 17: Landscape baseline plan

Photograph 1: Overgrown ponds at Tone Works

Photograph 2: Back stream through Tonedale Mill

Photograph 3: Tonedale Mill from Fox's Field on the River Tone floodplain

Photograph 4: Area of wetland in Fox's Field to the rear of Tonedale Mill

Photograph 5: Constructed leat through open space to the rear of Riverside and Springfield Road

Photograph 6: Wier at the top of the leat at Wellington Basins

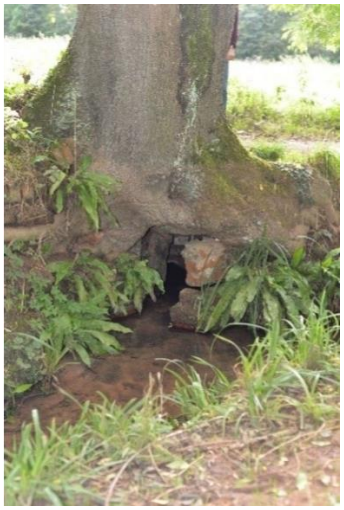
Photograph 7: Wellington Basins

Photograph 8: Leat on Westford Stream which flows into the Basins

Photograph 9: Weir at the Westford Stream and Rockwell Stream

Photograph 10: Bridge crossing at the sump

Photograph 11: Abandoned leat on Westford Stream



Photograph 12: Water feeding sump and basins from Rockwell Stream under the beech tree

Photograph 13: Weir and sluice gate on Rockwell stream

Photograph 14: Chimney stack of Tonedale Mill visible in the wider landscape

Next Steps

4. Options Appraisal and Next Steps

4.1 Project Brief

The Study objective as set out in the specification is to:

"gain a clear understanding of ***the options and feasibility for mitigating possible future flooding in Tonedale, Wellington and the wider catchment****; whilst at the same time presenting innovative enhancements to the historic, landscape and ecological context."*

Where possible the options should align with the Somerset Moors and Levels Flood Action Plan targets:

1. Reduce the frequency, depth and duration of flooding.
2. Maintain access for communities and business.
3. Increase resilience to flooding for families, agriculture, businesses, communities, and wildlife.
4. Make the most of the special characteristics of Somerset (with internationally important biodiversity, environment and cultural heritage)
5. Ensure strategic road and rail connectivity, both within Somerset and through the county to the South West peninsula
6. Promote business confidence and growth.

Several of these targets around social and environmental improvements. These wider drivers are echoed within the Study brief, which will be tested with decision-makers and the community. Identification of holistic solutions with wider benefits is central to this project alongside the core aim to reduce flood risk to the Tone Works and Tonedale Mill sites. With respect to wider opportunities, the Study's specification notes: *identification of wider opportunities for ecological benefit, hydroelectric potential, phosphate mitigation, consideration for carbon, and access.*

Opportunities to co-deliver these benefits will be explored alongside developing a set of options to meet the principal project objective.

4.2 Next Steps

This Baseline Evidence Report has explored multiple considerations to enable a robust and agreed upon understanding of the baseline prior to the development of options. The next phase is the development of options and an Options Appraisal. This will seek to identify options for flood risk reduction, evaluate these against an agreed set of criteria, and identify additional opportunities across the catchment which could be linked together. The process is set out below:

1. Collaborative review of the drivers, opportunities, and constraints across the site with the client, steering group and community forum.
2. Define a long list of options to reduce flood risk in the area. These will include.
    a. Options in the wider catchment (storage and NbS)
    b. Options locally to the heritage sites of interest (defences, storage, wetlands, waterway diversion)
    c. Options for improving localised resilience.
3. In parallel, wider opportunities across the site will be identified.
4. The flood risk reduction options shall be assessed via a multi-criteria assessment to develop a shortlist of options to bring forward for feasibility assessment.
    a. The criteria shall be agreed with the client prior to the assessment. Due to the stage of the Study, this will be a qualitative assessment.
5. Exploration of options and opportunities with client and steering group.

6. Summarise the site wide flood risk reduction options appraisal and wider opportunity identification in an Options Appraisal report. This is to be supported by maps indicating options and opportunities across the site.

There is a programme of community engagement and public consultation running alongside this process which will feed in at key milestones to influence the vision.

A Steering Group of key stakeholders was established to guide and ensure robust decision-making throughout the progression of the Study. The 1st Steering Group meeting took place on 4th December 2023. Overall, there was agreement on the Study's vision and approach, and the themes of resilience and adaption to flood risk were highlighted as key considerations for the Study.

Appendices

A.1 Policy context

The following table summarises relevant policies and describes ways in which the Study will comply with each policy. Compliance is to be updated throughout the Study as options develop.

Policy	Policy Summary
Taunton Deane Core Strategy 2011 to 2028	
Policy SD 1 Presumption in Favour of Sustainable Development	Policy SD 1 outlines proactive actions taken to improve economic, social, and environmental conditions through proposed development. This Policy states that when making decisions on development the Local Planning Authority should take a positive approach that reflects the presumption in favour of sustainable development.
Policy CP 1 Climate Change	Policy CP 1 outlines the leadership attitude in addressing the causes and impacts of climate change and adapting to its effects. Proposals should address Climate Change by reducing the need to travel, identify how development meets the BREEAM standards, protect water quality and availability, adopt the sequential approach to flooding and consider the impact on the local community, economy, nature consideration and historical assets.
Policy CP 2 Economy	Policy CP 2 supports development which promoted the growth of green knowledge economy and which supports a balanced, self-contained local economy.
Policy CP 6 Transport and Accessibility	Policy CP 6 outlines the provision to improve accessibility to jobs, services, and community facilities, and reduce the need to travel. This Policy supports the improvement of cycling and walking routes to key destinations such as Wellington town centre. Parking should also be managed and should reduce congestion and pollution
Policy CP 7 Infrastructure	Policy CP 7 deals with infrastructure needs, and promoted the provision of physical, social and green infrastructure.
Policy CP 8 Environment	Policy CP 8 advocates to the conservation and enhancement of the natural and historic environment. This Policy outlined that development which would harm these interests, or the setting of towns and rural centres would not be permitted. The Policy supports development within sustainable locations to improve green infrastructure, public access, visual amenity and the overall quality of the natural environment, Where Development may cause harm, this should be mitigated and compensation provided for any adverse

Policy	Policy Summary
	impacts on landscape, protected or important species, important habitats and natural networks, river and ground water quality and quantity. Development should also ensure that flood risk is not exacerbated and should aim to reduce flood risk including mitigating the impacts of climate change.
Policy SP 1 Sustainable Development Locations	Policy SP 1 considers the creation and maintenance of sustainable, balanced communities, which will be provided by delivering new services, facilities and infrastructure. This Policy identifies that Proposals should make efficient use of land and follow a sequential approach, prioritising the most accessible and sustainable locations to maximise opportunities to make best use of land previously development. This Policy identifies Wellington as a secondary focus for growth within the Borough, to develop its role as a market town serving wider rural hinterland.
Policy SP 3 Realising the vision for Wellington	Policy SP 3 covers provision that will realise the vision for the beautiful market town of Wellington, managing growth to maintain Wellington's character, role and function. Policy SP 3 recognises Wellington as a secondary focus area, which will progressively implement urbans design improvements, improve way-finding and signs to assist pedestrians and cyclists on existing radial roads and at intersections.
Policy SP 4 Realising the vision for the Rural Area	Policy SP 4 covers provision that will realise the vision for the network of locally distinctive, beautiful villages and hamlets surrounded by ecologically rich and diverse landscapes. Growth will focus on supporting and enhancing hubs for the wider rural community. The Policy promotes sustainable transport options within rural areas, including an enhanced cycle network.
Policy SS 3 Wellington Longforth	Policy SS 3 Wellington Longforth identifies a new compact urban extension to the north of Wellington. The designation includes the provision of new housing, services and facilities such as a new GP surgery and community hall, land for employment use and a green wedge of 18 hectares between the residential area and employment area. The development should reflect the existing landscape character and provide well-designed public open spaces.
Policy SS 4 Wellington Cades / Jurston	Policy SS 4 Wellington Cades / Jurston identifies a new compact urban extension to the east of Wellington. This includes the provision of housing, local community services and a green wedge of approximately 30 hectares to the east of the new residential area and part of the green link from Wellington eastwards to the River Tone and West Deane Way. The development should reflect the existing landscape character and provide well-designed public open spaces.
Policy DM 4 Design	Policy DM 4 promotes a sense of place, addressing design at a range of spatial scales - town, district, village, neighbourhood, street, space, building. This Policy states new development should help create places which people enjoy, are attractive, safe and secure. Development should also use sustainable construction techniques, respect the amenity of its site and neighbouring area in terms of

Policy	Policy Summary
	scale, height, layout and style. Development should also provide access to high quality public spaces to create sustainable communities.
Policy DM 5 Use of Resources and Sustainable Design	Policy DM 5 requires all development to incorporate sustainable design features to reduce their impact on the environment, mitigate and adapt to climate change, and particularly help deliver reduction in CO2 and other greenhouse gas emissions.
Taunton Deane Site Allocations and Development Management Plan (2016)	
Policy WEL1 Tonedale Mill	Spatial Policy WEL1 allocates land at Tonedale Mill for a mixed use development including around 220 dwellings and 1.5 hectares of Class B employment development. The Policy identifies that development must maximise the re-use of listed buildings, reflect heritage, consider the stream frontage, consider flood mitigation, and benefit employment.
Policy C1 Reserved Land for Educational Purposes	Policy C1 reserves land for educational purposes. This is to ensure the educational needs of the area are met through the provision of educational infrastructure. Pertinent to the Study area includes land west of Courtfields School, Wellington.
Policy C2 Provision of recreational open space	Policy C2 outlines the importance of open space and sports and recreational facilities in creating healthy and sustainable communities. This Policy ensures development contribution to open space and ensure that there is the provision of excess good quality recreational facilities which are in accessible locations.
Policy ENV1 Protection of trees, woodland, orchards and hedgerows	Policy ENV1 considers the value of landscape, character or wildlife, and seeks to provide net gain where possible. This policy seeks the proper management of trees, woodlands, orchards, historic parklands and hedgerows for nature conservation purposes. Development should minimise the impact on trees, woodlands, orchards, historic parklands and hedgerows of value to the areas landscape, character or wildlife and seek to provide net gain where possible.
Policy ENV3 Special Landscape Features	Policy ENV3 considers the appearance and character of landscape quality within Special Landscape Features. It is stated that development which would significantly harm the appearance, character and contribution of landscape quality within Special Landscape Features will not be permitted unless appropriate mitigation measures reduce such harm to an acceptable level.
Policy ENV4 Archaeology	Policy ENV4 seeks to protect sites of archaeological importance, requiring satisfactory evaluation of the archaeological value of a site proposed for development. This Policy states development which affects a sites archaeological setting will not be permitted unless their archaeological and historic interest, character and setting would be preserved.
Policy ENV5 Development in the	Policy ENV5 highlights development should positively contribute to the creation, protection, enhancement and management of the water network and blue infrastructure. Development should improve public access to, along, and from the waterway and improve the environment quality of the waterway corridor, protect access for vehicular maintenance and future uses, optimise views of water

Policy	Policy Summary
vicinity of rovers and canals	space through siting, configuration and orientation of buildings, and prevent adverse impact on amenity including noise, odour, visual and lighting impacts unless adequate compensation and mitigation is provided as part of the application.
National Planning Policy Framework (NPPF) 2023	
3. Plan-making	Paragraph 16 of NPPF highlights that plans should achieve sustainable development in a way that is aspirational but deliverable. Plans should involve communities and stakeholders early and proportionately. Plans should be clear and accessible. In addition, Paragraph 17 states that development should adhere to local planning authority's priorities for the development and use of land in its area.
8. Promoting healthy and safe communities	Paragraph 92 of the NPFF highlights that plans should aim to achieve healthy, inclusive and safe places. Plans and development should also ensure provision for social, recreational and cultural facilities, and services to meet community needs (Paragraphs 93). Paragraphs 94-97 highlight that development should consider the social, economic and environmental benefits of estate regeneration, as well as educational and public service infrastructure, with adequate public safety considerations. It is also stated the need to secure a network of high-quality open spaces which provide opportunities for sport and physical activity (Paragraph 98).
9. Promoting sustainable transport	Paragraphs 104-106 give provision for transport issues, which should be considered at early stages. There is the promotion of opportunities to change transport technology and design places that promote walking, cycling and public transport, identify environmental impacts and seek net environmental gains. Plans should seek active involvement of transport infrastructure providers. Furthermore, Paragraphs 110-113 identify the need for development to create safe, suitable and sustainable designs relating to transport networks.
11. Making effective use of land	Paragraphs 119-123 highlights the need for the effective use of land to meet needs of the community, while safeguarding the environment and ensuring safe living conditions. This section recognises multiple benefits and functions obtained from urban and rural land use, supporting land remediation in order to reflect the demand for land. Paragraph 125 highlights the importance of considering character assessments, design guides and codes to ensure land is used efficiently, is attractive and sustainable.
12. Achieving well-designed places	Paragraph 126 outlines the need for plans to achieve high quality, beautiful and sustainable buildings and places. There should also be provision for local aspirations to be reflected at the most appropriate level of a plan's vision. Proactive engagement with the community should influence the design and style of plans, as well as expectations in line with local interests (Paragraph 127).

Policy	Policy Summary
	In accordance with Paragraphs 128-129 plans should follow the principles within local and national design guide or codes, tailored to circumstances and scale. Paragraph 130 highlights the long-term role a development can have to contributing to good landscaping, character, and quality of life over the lifetime of the development. When considering trees, Paragraph 131 ensures that opportunities are taken to incorporate trees for the improvement of character, urban environmental quality, and climate change mitigation and adaptation.
14. Meeting the challenge of climate change, flooding and coastal change	As stated in Paragraph 152, the planning system should support the transition to a low carbon future in a changing climate. Development should have consideration for the range of impacts arising from climate change and should contribute to the reduction in green house gases (Paragraph 154). Paragraph 158 outlines that local planning authorities should approve applications if its impacts are acceptable. In regard to planning and flood risk, Paragraph 159 states that inappropriate development in areas at risk of flooding should be avoided and that all plans should apply a sequential, risk-based approach to the location of development (Paragraph 161).
Planning Practice Guidance	
Air Quality	Provides guidance on how air quality can be considered within development, including detail surrounding air quality assessments and how air quality can be mitigated.
Climate Change	This PPG outlines the challenges of climate change, and how development can address such challenges. The guidance also identifies suitable mitigation and adaptation measures in the planning process to address the impacts of climate change.
Design: process and tools	Provides advice on the key points to take into account on design. This piece of guidance advocated for well-designed placed through taking pro-active and collaborative approaches.
Flood risk and coastal change	This guidance note advises how to take account of and address the risks associated with flooding and coastal change in the planning process. The flood risks caused by development is highlighted in addition to guidance on flood resistance and flood resilience.
Historic environment	This guidance advises on enhancing and conserving the historic environment. Development should seek opportunities in the area for the enhancement of conservation areas and heritage assets including their setting.
Natural environment	This guidance identifies the key issues in implementing policy to protect and enhance the natural environment, including local requirements. The Guidance promotes the provision of green infrastructure to create benefits such as enhanced wellbeing, outdoor recreation and access as well as enhanced biodiversity. Green infrastructure should aim to mitigate against climate change, conserve and enhance the natural environment as well as promote healthy and safe communities.
Open space, sports and recreation facilities,	This Guidance note key advice on open space, sports and recreation facilities, public rights of way and the new Local Green Space designation. It is stated that new development should consider open space to provide health benefits to the community as well as be

Policy	Policy Summary
public rights of way and local green space	an important part of the landscape and setting of the built environment. It is also a key component to achieving sustainable development.
Water supply, wastewater, and water quality	This Guidance note advises on how planning can ensure water quality and the delivery of adequate water and wastewater infrastructure. It highlights that through good design of water infrastructure and mitigation measures the water environment can be protected. It is identified that flood risk can be reduced and biodiversity and amenity improved through development which includes permeable surfaces and other sustainable drainage systems, removing artificial physical modifications and recreating natural features.

A.2 Indicative ecological potential and considerations.

Below are a set of initial considerations for habitat and species recovery or reinstatement that have been identified from a walkover of the Study corridor:

- Natural flood management along the watercourses; creation of leaky dams, bank re-profiling: re-meandering in sections which may be channelised or straightened.
- Creation of marginal backwaters to create suitable fish spawning areas.
- Removal of redundant artificial structures along the watercourse and/or retrofitting of fish/eel passes, in agreement with the Environment Agency and Westcountry Rivers Trust.
- Thinning of woodland corridors to reduce shading and allow more aquatic vegetation growth, retaining trees with significant biodiversity value (*i.e.*, bat roosting potential).
- Re-profiling of banks, including creation of shelves and berms to encourage diverse aquatic marginal habitat for foraging and burrowing water vole.
- Where necessary/relevant, fencing of cattle to prevent poaching.
- Maintenance of a riparian buffer (at least 10m) for protection from agricultural activities (such as run-off).
- Safe removal and eradication of INNS and replacement with appropriate native species.
- NbS to improve water quality, to provide a benefit to downstream IDSs.
- Introduction of artificial habitat features, such as:
    - Kingfisher perches and nest holes
    - Otter holt (in a suitable low-disturbance location to provide resting and breeding opportunities)
    - Log piles/areas of brash and deadwood to provide hibernacula habitat for invertebrates, reptiles and amphibians
    - Bird nest boxes/bricks and bat boxes on retained buildings/structures and trees
    - Hedgehog houses within suitable hedgehog habitat
- Re-introduction of Eurasian beavers (*Castor fiber*) to the catchment would provide a natural solution for the improvement of water quality, reduction of flood risk and the creation of wetland habitats that support a range of other important species. A more detailed survey would be required to identify the most appropriate area for beaver reintroduction, including a more detailed analysis of the woodland habitats along the Study corridor surrounding the reaches. Currently, Defra still requires that beaver reintroductions are contained within a fenced area. However, if this changes it may be that beavers could be released into the wild without the requirement for fencing, which would reduce the cost and management implication of beaver reintroduction.
- Re-introduction of white-clawed crayfish (or creation of an Ark site[54]) if not already present and the substrate of the River Tone or Westford Stream are confirmed as suitable or can be enhanced. This

[54] Buglife and Environment Agency. Crayfish Ark Sites and Conservation https://cdn.buglife.org.uk/2019/07/Crayfish-Ark-Sites-and-conservation-Final.pdf [Accessed Nov 2023]

would also require consultation to understand the presence of signal crayfish within the catchment.

- Creation of additional ponds with natural banks to provide more breeding habitat for great crested newt and water vole and enhance the biodiversity of the site.
- Enhancement of existing habitats to increase suitability for marsh fritillary butterfly, to provide supporting habitat for the Quants SAC.
- Enhancement of HPI parcels along the Study corridor.
- Strategic creation of locally important habitats, as identified by Somerset Council, that are suitable for the relevant soil type. This should ideally include native, locally sourced, appropriate and diverse plants; however, non-native species may be considered with regards to climate change resilience.
- Strategic habitat design to ensure disturbance-free areas are maintained for wildlife.
- As well as more detailed consideration of the identified opportunities, next steps within the Options Appraisal process include:
- High-level assessment of how options may impact, negatively or positively, upon identified ecological receptors.
- High-level consideration of BNG potential of the different options.
- Exploration of green finance opportunities; there is potential for the enhancement and creation of habitats to result in to tradeable biodiversity units, carbon units and nutrient credits with an estimated market value that reflects government guidelines on credit stacking and trading rules for BNG.
- Obtain ecological network mapping and/or information on strategically significant habitats in order to inform habitat proposals.
- Consideration of the eight IUCN global standards criteria to ensure that NbS are developed to a high standard, delivering holistic benefits to flood risk, nutrient reduction and climate mitigation.

A.3 Policy and best practice guidance used for historic environment baseline reporting.

Heritage assets are protected through national legislation, national and local planning policy. Those relevant to this scheme are:

- Planning (Listed Buildings and Conservation Areas) Act 1990;
- National Planning Policy Framework (NPPF) 2023 (section 16);
- Wellington Place Plan 2023, which sets out a vision, spatial framework and delivery strategy for the town.
- The Taunton Deane Core Strategy (adopted 2012) Policy CP8 Environment & SP4.3 Wellington
- Tonedale Regeneration Strategy and Delivery Plan (2018)
- Taunton Deane Adopted Site Allocations and Development Management Plan. Policy ENV4 Archaeology
- Rapid Conservation Area Review for Wellington (SWHT, 2018) and map
- Wellington Conservation Area Appraisal (2007)
- Tonedale Masterplan and Planning Brief

This report has been compiled following the best practice guidance and standards laid out in the following documents:

- CIfA (2020) *Standard and Guidance for Historic Environment Desk-Based Assessment*;
- CIfA (2022) *Code of Conduct: Professional Ethics in Archaeology*;
- Nixon et al (2021) *Archaeology and construction: good practice guide*. CIRIA C799;
- English Heritage (2008) *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment*;
- Historic England (2015) *Managing Significance in Decision Taking in the Historic Environment. Historic Environment Good Practice Advice in Planning: 2*;
- Historic England (2017) *The Setting of Heritage Assets. Good Practice Advice in Planning. Note 3 (Second Edition)*;
- Historic England (2019) *Statements of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12*;
- Historic England (2022) *Planning and Archaeology. Historic England Advise Note 17*, and;
- IEMA (2021) *Principles of Cultural Heritage Impact Assessment in the UK.*

Next steps of the study will also adhere to this best practice guidance.

A.4 Somerset Historic Environment Record (SHER)

The following table summarises the non-designated heritage assets recorded by the SHER within a 250m buffer of the study area.

Name	PRN	Period	Description
Later prehistoric or Roman enclosure, N of Tone Bridge, Langford Budville	42682	Prehistoric	The cropmark of a possible later prehistoric sub-square enclosure can be seen on HE Reconnaissance aerial photographs taken in 2010. This enclosure, with a possible annex on its southern side, is situated on a slope above the River Tone at ST 1270 2226. The cropmarks of a possible track way defined by parallel ditches to the north.
Cropmark enclosure, N of Tone Bridge, Langford Budville	42683	Prehistoric	The indistinct cropmarks of a possible post-medieval enclosure can be seen on HE Reconnaissance aerial photographs taken in 2010. This is situated on a slope above the River Tone at ST 1284 2215. Three side of a rectilinear enclosure are visible, the fourth may have been defined by post medieval field boundary, also seen as a cropmark. There are very slight cropmarks further to the south-west that may suggest a larger and earlier (perhaps later prehistoric) enclosure cut by the boundary.
Cropmark enclosure, Crosslands, Wellington	44167	Prehistoric	Corner of rectangular enclosure with double ditches seen on aerial photography.
Water management system, The Basins, Wellington	36840	Post Medieval	A system of diverted watercourses with culverts, sluices, spillways and weirs all constructed between 1801 and 1803. The most substantial features were two reservoirs with areas of 0.84 acres and 0.38 acres, the northerly and larger one having an original depth of about two metres.
Boathouse, Nynehead Court park	39880	Post Medieval	A boathouse is recorded being thatched in 1815. The bases of two walls survive.
Upper weir, Nynehead Court park	39879	Post Medieval	Weir built as part of the canalisation of the river Tone, 1810-17.
Ornamental canalisation of river Tone, Nynehead Park	39878	Post Medieval	As part of the landscaping around Nynehead Court, a wide canal was created for the river Tone between 1810-17. It is now much silted up.
Grand Western Canal	44126	Post Medieval	The Grand Western Canal as built was a fragment of various ambitious schemes to connect Bristol and Exmouth. One of these was for a canal from the Exe at Topsham to the Tone in Taunton. In 1838 the line to

			Taunton was opened. The length was 24.5 miles and no more of the Grand Western canal was built. In 1842 the Bristol and Exeter Railway arrived in Taunton and the canal was sold.
Canal footbridge site, Tonedale	44145	Post Medieval	A footbridge of iron and masonry which crossed the Grand Western Canal (44126) has been demolished. Contemporary plans show a culvert at this location.
Fox's canal wharf, Tonedale, Wellington	39873	Post Medieval	Henry Fox proposed to form a small basin at right angles to the canal and a deed of covenant was signed on 31 December 1842. Henry Smith's plans show 'Fox's intended wharf' and is not known if it was ever constructed. There is nothing shown on the 1842 tithe map.
Canal aqueduct, Tonedale, Wellington	39872	Post Medieval	The original cast-iron aqueduct was taken down and replaced at some date. The original abutments can still be seen.
Canal wharf and possible limekiln, Tonedale, Wellington	39871	Post Medieval	A public wharf is recorded immediately west of the Milverton Road. 'Tonedale Wharf' shown clearly on the 1842 tithe map with a structure that appears to be a double limekiln at the south.
Bristol and Exeter Railway	12964	Post Medieval	The Bristol and Exeter Railway raised capital in 1835 and obtained an act the following year. Work proceeded, engineered by Brunel, from both ends but was faster in the north which reached Bridgwater in June 1841 and Taunton a year later. A temporary terminus was established at Beam Bridge (ST108195) in 1843 until the line was completed to Exeter in 1844. The Taunton avoiding loop was added in 1896 and a line into the Royal Ordnance Factory in 1940. The line between Coagload Junction and Norton Fitzwarren was quadrupled in 1932 to reduce congestion in Taunton Station and as a government funded job-creation scheme during the depression.
Railway station, Wellington	14660	Post Medieval	Opened on 1st June 1843 and re-modelled in 1931-32 when the platforms were moved out onto two loops leaving the original lines in the centre for through traffic. The station was called "Wellington Somerset" to avoid confusion with Wellington in Shropshire. The station closed on 5th October 1964.
Footbridge N of Winsbeer Farm, Wellington	36837	Post Medieval	This wrought-iron footbridge across the river Tone appears to have survived intact and its design is similar to others in the Wellington area.
Eighteenth-century Turnpike road, Milverton to Tone Bridge, Wellington	26235	Post Medieval	A turnpike road of the Wiveliscombe Trust. The road was turnpiked as far as Langford Gate, ST115232, in 1786, and the rest in 1806. The road has been diverted fairly recently at the approach to Tone Bridge, the old road remaining to the southwest.

Loomshop, Tonedale Mills	41446	Post Medieval	Built by 1839 but probably of early 19th century date and forming the boundary of the site. Several changes in use are evident, most caused adaptations to serve adjacent later buildings, including a beam engine house and extensive weaving sheds. Although it was not powered, the building probably served an ancillary manufacturing function to the main water-and steam-powered mills which stand on the opposite side of the road to the south. The building is significant as a surviving early component of the largest integrated textile mill in the South-West of England. The building was demolished in the late 1990s.
Lime kiln and quarry west of Winsbeer Farm, Wellington	37402	Post Medieval	In 1786 there is evidence in the form of a bond supporting agreement involving Thomas Marsh, James Baron and John Pyne as partners in building and operating lime kilns and quarrying 'a lime rock' on Winsbeere [sic] tenement. By 1841, both the kiln and quarry to the south of the Grand Western Canal (PRN 44126).
Goods shed, Wellington Station	29982	Post Medieval	The goods shed is one of the few buildings to remain from Wellington Station.
Lime kilns and quarry near Winsbeer Farm, Wellington	37403	Post Medieval	Two lime kilns are shown on ground between the river Tone and the canal with a large quarry to the south. A book of reference of 1841 accompanying a canal survey shows Sir William Follett as owner with the occupier named simply as 'Clarke'. The Ordnance Survey map of 1888 marks 'Old Quarry' with the land on which the kilns were built given over to forestry.
Winsbeer Canal Lift, S of Runnington	44506	Post Medieval	A canal lift on the Grand Western Canal. With a vertical rise and fall of 18ft., the Winsbeer structure was one of the shortest of the seven lifts along the Grand Western Canal. It is shown in outline on the Wellington Tithe map of 1842 and was in use from 1835 to 1867.
Grease Refinery, Tonedale, Wellington	19940	Post Medieval	The Grease Works was associated with the two Fox Brothers woollen mills in Wellington. The origins of the plant are unclear but there are records of attempts to control river pollution from the 1850s. The company was sued in 1892 but had already established the grease refinery, probably as a result of changes to the law in 1876. The court case probably encouraged the enlargement of the plant. Further expansion was carried out in the 1950s and 60s following more changes to the laws controlling river pollution, but the plant was being run down in the 1970s as the woollen trade declined. As well as controlling pollution, the works recovered useful products from the wool washing effluent, principally the grease and lanolin. Effluent from the dyeworks was also treated on the site. Eight periods of development were identified during the recording works prior to demolition and redevelopment.
Saw Mill, Tonedale	43719	Post Medieval	"Saw mill" printed on Ordnance Survey 25":mile County Series (Somerset) map of 1930.

Milestone, Tone Bridge, Langford Budville	19881	Post Medieval	'M.S Wellington 1' shown on Ordnance Survey map of 1904. Not shown on recent mapping.
Lime kiln, Runnington	43267	Post Medieval	"Old limekiln" printed on OS 6" map of 1938.
Tone Bridge, Wellington	45203	Modern	Tone No 2 bridge rebuilt in 1914 for £146.

The following table summarises the previous archaeological investigations recorded by the SHER within a 250m buffer of the study area.

Investigation Name	PRN	Investigation Type	Description
Excavation (2002), Tonedale Mills, Wellington	16088	Archaeological Investigation	Four trenches were excavated at Tonedale Mills (43720) within the site of the former weaving shed (41446) demolished in the late 1990s. Trench 1 (3.3m by 2.3m) was located on the western face of a wall running NNW - SSE towards the western end of the weaving shed. An arch was located running under the wall possibly to allow the culverting of an earlier open channel, the tailrace from the early water powered mill. Trench 2 (3.7m by 2m) was located to the SE of the site, it uncovered remains of a doorway and steps possibly leading down to the cellar. Trench 3 (14m by 11m) located to the southern end of the weaving shed and to the NE of trench 2. The earliest structure recorded was the loomshop. A series of N-S walls of probable load bearing capacity comprising the foundations of the weaving shed were recorded. The base of the steam engine was exceptionally well preserved, with evidence for the replacement of the original vertical engine with a horizontal engine. Trench 4 was located approximately 30m SE of trench 1 and pinpointed the alignment of the culvert noticed in trenches 1 and 3. It also proved the cellar extended along the N-S half of the building.
Watching brief and building recording (2014), Tonedale Mills, Wellington	32691	Watching Brief; Building Recording Survey	The buildings of the grease recovery plant were recorded before and during demolition and the information added to that from historical sources to provide a detailed description of the site, its history and the processes undertaken.
Ground penetrating radar survey (2021), Tone Works, Wellington	47259	Ground Penetrating Radar (GPR) Survey	Ground Penetrating Radar (GPR) survey of Tone Works identified many of the underfloor channels through the factory surviving beneath the extant buildings, including the assumed line of the headrace and tailrace served the waterwheel.