JBA consulting

Water Lane Emergency Access and Egress Route Plan

FINAL

Version 3.0

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Exeter City Council

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Contract

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This report describes work commissioned by Exeter City Council by an instruction dated 26 January 2024. The Client's representative for the contract was Jill Day of Exeter City Council. Suzanne Tulloch and Toby Jones of JBA Consulting carried out this work.

Purpose and Disclaimer

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Abbreviations

AEP ....Annual Exceedance Probability

CC ....Climate Change

DTM ....Digital Terrain Model

EA ....Environment Agency

EAE ....Emergency Access and Egress

EAERP ....Emergency Access and Egress Route Plan

FRA ....Flood Risk Assessment

FRP ....Flood Response Plan

JBA...........................Jeremy Benn Associates

MCA ....Multi-Criteria Analysis

NPPF........................National Planning Policy Framework

OS ....Ordnance Survey

Definitions

Flood Risk Assessment: A site-specific assessment of all forms of flood risk to the site and the impact of development of the site to flood risk in the area.

Fluvial flooding: Overland flooding occurring from a river, lake or stream overflowing.

Surface water flooding: Overland flooding occurring from rainwater being unable to drain away through existing drainage systems.

Reservoir flooding: Water escaping from a reservoir, for example as a result of dam failure.

Risk: In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood.

1 Introduction

1.1 The Commission

JBA Consulting were commissioned by Exeter City Council in January 2024 to undertake an Emergency Access and Egress (EAE) Study.

The work provides key evidence for progressing the new Exeter Plan due for submission autumn 2025 and for the determination of planning applications for various parcels of land, including Water Lane, Exe Bridges and Red Cow.

1.2 The Exeter Plan

The Exeter Plan will allocate sites for housing, employment and mixed-use development, drawing on Liveable Exeter, a transformational housing delivery initiative for the city. Launched in 2019, Liveable Exeter is a bold initiative to build new homes in the city and transform brownfield land into high quality developments, to strengthen existing communities and create new neighbourhoods. It presents an alternative to building on green spaces which will protect Exeter's unique characteristics. The Exeter Plan aims to renew the city in ways which benefit people, the environment and the economy and to deliver around 13,500 new homes, including significant numbers on large scale brownfield sites, helping to improve health and wellbeing, increasing the vitality of the city and meeting the Council's 2030 net zero ambition.

1.3 Water Lane

Water Lane is one of the strategic scale brownfield sites identified in the emergent Exeter Plan as suitable for mixed use redevelopment and presents an exciting and unique development opportunity. With a rich industrial and maritime history, it is adjacent to the canal and canal basin which still have a maritime function. Currently it is underutilised and disconnected from other parts of the city, providing an opportunity to rethink connectivity in Exeter with a focus on the strategic principles of the Exeter Plan, including increased opportunities for walking and cycling. The Liveable Water Lane Development Framework and Design Code Supplementary Planning Document supports the delivery of this site.

As the site is almost entirely located in Flood Zone 3 (see the Exeter Level 2 Strategic Flood Risk Assessment), it is imperative that inclusion of safe emergency access and egress is factored into the strategic planning phase. After a staged process of evidence gathering, stakeholder engagement, analysis (including multi-criteria options appraisal) and review, the preferred emergency access and egress route option for Water Lane has been identified.

This Route Plan describes the strategic emergency access and egress route for Water Lane and sets out the concept design for how this will be developed. Further detailed design of emergency access and egress routes will be required at a later stage to inform development proposals.

Figure 1-1 shows the location of Water Lane and its relationship with the other two sites for which emergency access and egress route plans are being developed: Exe Bridges and Red Cow.

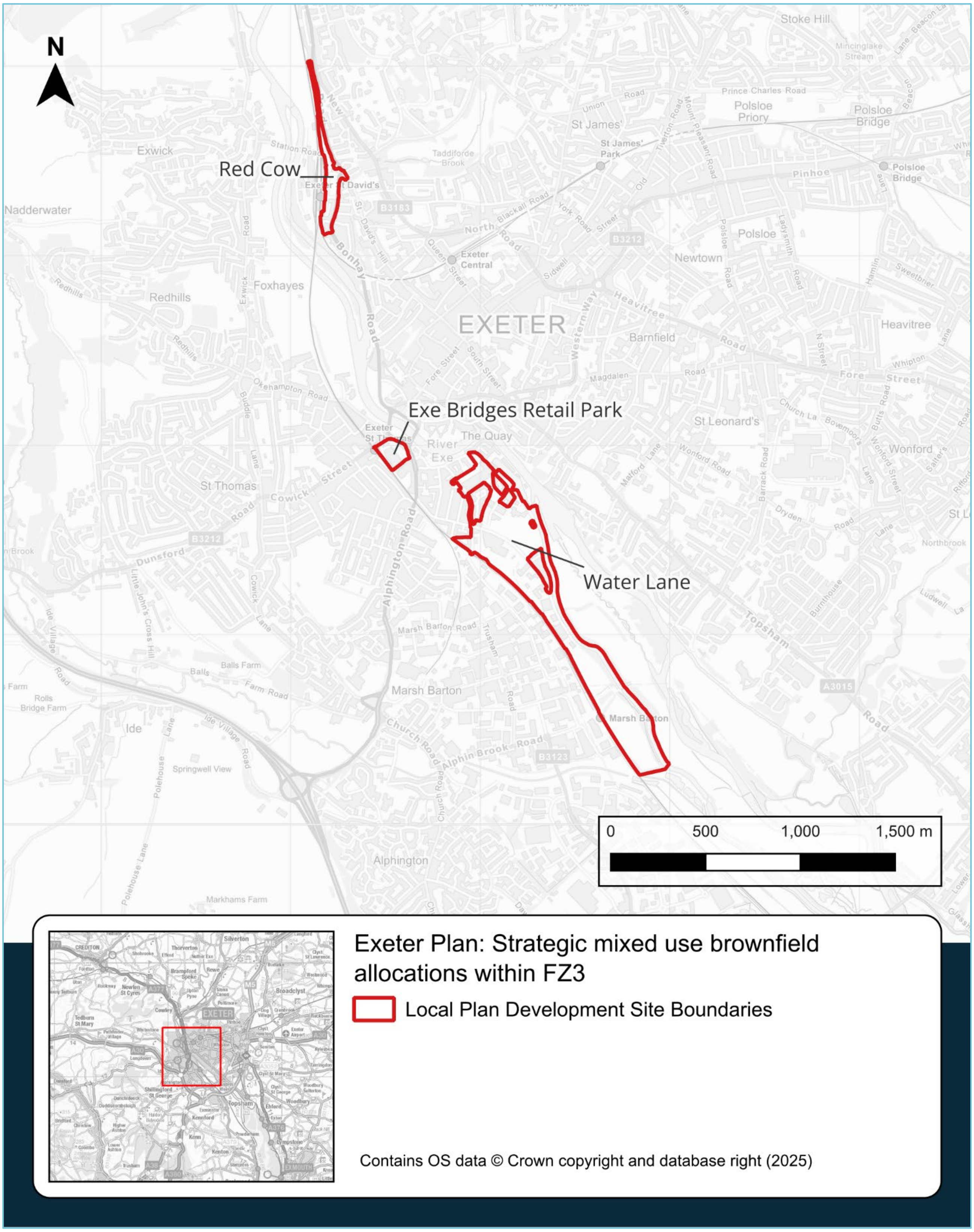


Figure 1-1 - Exeter Plan Site Locations

2 Context and background

2.1 Aim

Water Lane is in an area at risk of flooding in the medium-term future, particularly as a result of climate change impact on flood events; this risk can be mitigated by the provision of an emergency access and egress route. This Emergency Access and Egress Route Plan (EAERP) presents the preferred strategic access and egress route for the Water Lane strategic mixed use brownfield allocation. It aims to present a strategically appropriate, and deliverable, safe emergency access and egress route for use during a flood and immediately after a flood event.

2.2 Scope

This Emergency Access and Egress Route Plan has been informed by the Exeter Level 2 Strategic Flood Risk Assessment (SFRA) completed by JBA Consulting in 2025 on behalf of Exeter City Council, which identifies flood risk resulting from fluvial, surface water and groundwater sources. Extensive consultation has been carried out with a wide range of stakeholders using multi-criteria analysis through workshops run in 2024. Full details of the approach taken can be found in the Water Lane Options Appraisal document. These investigations have informed the preferred route for safe emergency access and egress. This Route Plan presents the process followed to identify the preferred route, the emergency access route itself, detailing each stage of the route, and a high-level estimated timeline. It does not detail short or long-term recovery actions for during or after a flood event.

2.3 Site Information

2.3.1 Site location

A location plan is shown in Figure 2-1. The site is in close proximity of the Exeter Ship Canal and the River Exe, located by the Riverside Valley Park. It is a 15-minute walk from the City Centre and is served by Exeter St Thomas and Marsh Barton train stations.

2.3.2 Site description

The site is largely brownfield and includes a mixture of derelict buildings and land, commercial, leisure and some retail units, plus car parks, an electrical substation and a small area of open space. Its topography is largely flat with elevations ranging from 5m AOD to 9m AOD. The higher ground is occupied by a disused gas storage site, railway sidings and a solar farm in the south.

The Exeter Ship Canal runs north to south and forms the eastern boundary of the Water Lane site. The main channel of the River Exe is situated immediately east of the canal, within approximately 50m of the northern section of the site. The River Exe remains within a maximum distance of approximately 300m of the southern half of the site. The main line railway from Exeter to Penzance forms much of the western boundary of the site.

2.3.3 Existing Access

Access to the site is gained from the north-west on Water Lane and Haven Road, joining Alphington Road (A377) just to the west of the site. Vehicular access is largely prevented from the east by the Exeter Ship Canal and the River Exe and from the west by the main line railway. Pedestrian and cycle access is currently possible over the Exeter Ship Canal and via an underbridge of the railway line from Marsh Green Road North towards Water Lane and there are currently two vehicular access connections across the railway:

- A bridge under the railway on Tan Lane provides restricted single lane access for vehicles (permit holders only) to the northern end of the site.
- Clapperbrook Lane East provides single lane access to the southern section of the site.

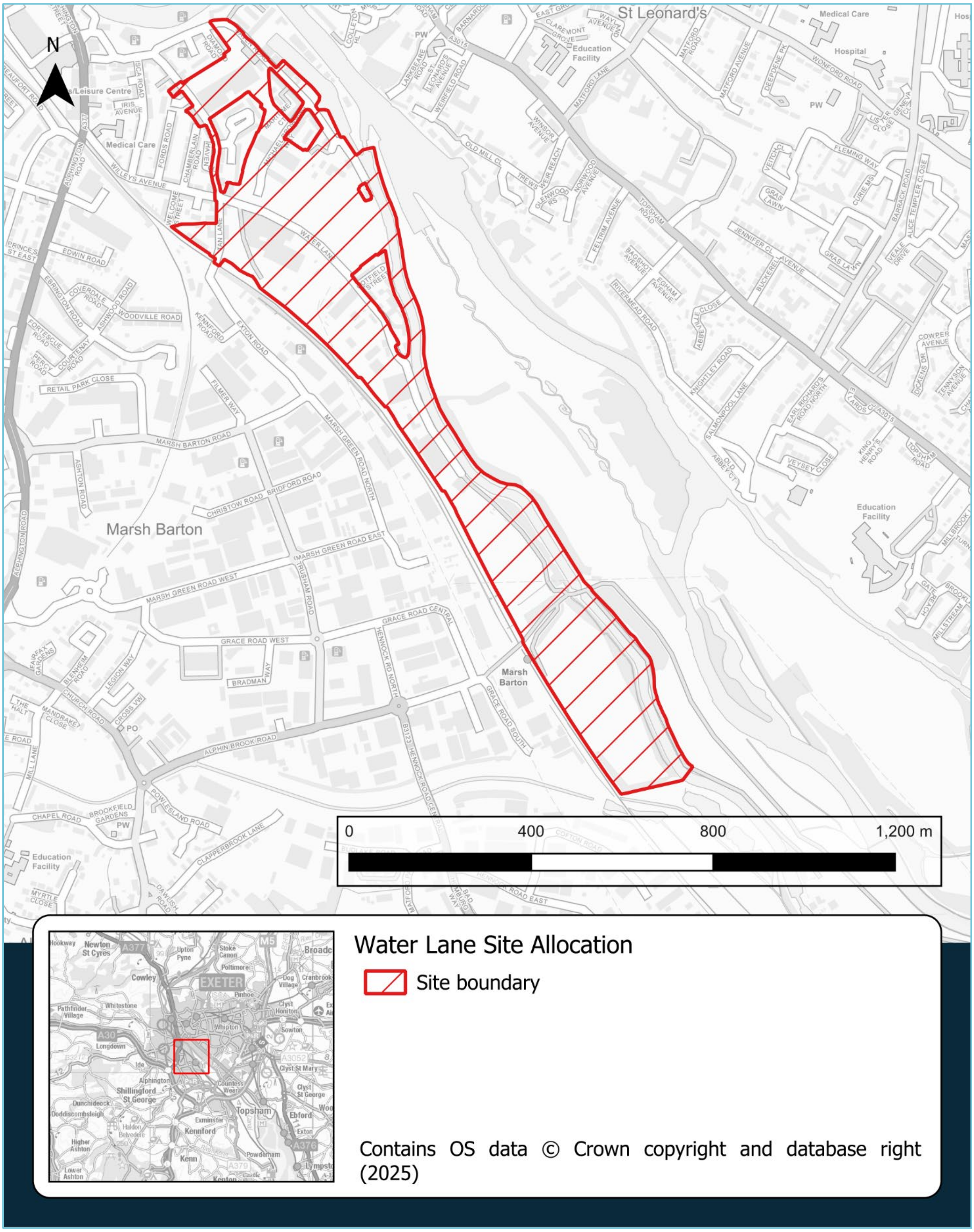


Figure 2-1 - Water Lane Site Allocation

2.4 Flood Risk

2.4.1 Overview

The site is at high risk of fluvial flooding, high risk of surface water flooding, varying risk of groundwater flooding and low risk of flooding as a result of a reservoir or canal embankment failure.

The principal watercourse in the vicinity of the site is the River Exe, located along the eastern boundary. There is an embankment defence along the east bank of the Exeter Ship Canal, part of the Exeter Flood Defence Scheme (delivered 2014-2021), which provides a Standard of Protection to withstand a 1 in 200 annual exceedance probability event.

For further flood risk analysis please refer to Appendix A - Flood Risk.

2.5 Lead Times

2.5.1 Modelled Lead Times

Detailed hydraulic modelling shows that there are significant lead times ahead of flooding from the River Exe for the Water Lane site. The slow responding nature of the River Exe means that the Environment Agency can forecast potential flooding usually 2-3 days in advance of a fluvial event from the River Exe occurring.

From initial out of bank flooding occurring in the Water Lane area, there are a further 3 hours before on-site flooding becomes widespread.

The lead times provided are sufficient for emergency planning through gathering situational awareness, decision making, escalation of response and communication with the public in relationship to safety from flooding in the Water Lane area in advance of flooding occurring within the catchment. Lead time for specific operational responses (e.g. gate operation and barrier deployment) may be shorter due to local flood dynamics considerations.

3 Emergency Access and Egress Route Selection

3.1 Background

The emerging Exeter Plan provides the context in which development in Exeter will be delivered over the plan period to 2042. This Emergency Access and Egress route will allow development on available previously brownfield land and in the process provide the city with much needed modern, liveable housing.

3.2 Overview of Methodology

Following a structured process involving evidence gathering, stakeholder engagement, multiple multi-criteria options appraisals, and thorough review, the preferred emergency access and egress route for Water Lane has been identified. A first workshop was conducted to achieve a shared understanding of local flood risk, the project plan, priorities for potential solutions to emergency access and to identify high level criteria for route options. Following this, JBA carried out direct engagement with Exeter City Council to narrow down the route options into a shortlist. A second workshop was held to present the route multi-criteria analysis (MCA) process to inform identification of the preferred route option. As well as the workshops, there was ongoing engagement with a number of parties, particularly the EA, throughout the process.

3.3 Stakeholder Engagement Workshops

Stakeholder engagement was a key part of the process of identifying potential route options for safe access and egress. Stakeholders included Exeter City Council, Devon County Council, Environment Agency, Network Rail, South West Water, Devon and Cornwall Police, Devon and Somerset Fire and Rescue, landowners, developers, community groups and LDA Design Consulting Ltd. Workshops were held in March and July 2024. Delegates were invited to explore options and opportunities for emergency egress concepts.

The first workshop presented concept options and provided a space for their discussion, focusing on exploring and identifying the criteria which will be used to inform the high-level categories for the second phase, the route multi-criteria analysis. Criteria for emergency planning, community, and project impact were considered in the first instance and stakeholders were invited to propose elements of value to their organisations. Attendees were then asked to rank criteria under the headings of emergency planning, community and project impact in order of importance (Figure 3-1). They were further asked to rank the stakeholder proposed factors (Figure 3-2).

Emergency Planning	Community	Project Impact
• Reliability and safety • Capacity • Speed of evacuation • Accessibility by Cat 1 responders • Accessibility for site users • Alternate route options	• Access to amenities • Aesthetic impact • Dual purpose (other uses) • Disruption during build • Flexibility	• Impact on flood risk • Biodiversity/environmental impact • Carbon impact • Construction costs • Maintenance requirements

Figure 3-1 – Workshop 1 Criteria to Inform MCA Ranked Results

Highest	Next Highest	Medium	Lowest
• Safe and dry • must not block flood flow routes • Always available • Affordability • Signposted and well communicated • Accommodate 2-way movement • Sufficient marshalling space at end of route • High ranking for Emergency Planning criteria • Usability for vulnerable users	• Must link into existing properties • Accessible to all • Deliverability • Has other uses • Bridge clearance over waterways • Upgrading of existing bridges to accommodate emergency vehicles • Step free • Should accommodate county waste sites in the vicinity	• Placemaking • Carbon considerations • Doesn't foster anti-social behaviours • Passive is best - not managed or need to be temporarily constructed • Not creating loss of privacy for existing homes • Ownership and maintenance • Embarking/disembarking from route to home	• Stabling / marshalling point close to route • Can take emergency vehicles

Figure 3-2 – Workshop 1 Stakeholder Proposed Factors Ranked Results

The second workshop aimed to achieve a shared understanding of the multi-criteria analysis (MCA) approach to creating the shortlist of route options, to discuss these options, to validate the formal MCA options appraisal and support the identification of the preferred shortlist option for each site. During group discussions, participants were requested to provide commentary on the risks, benefits and potential modifications that could be made to concepts for each of the options.

3.4 Route Multi-Criteria Analysis (MCA) Options Appraisal

Multi-criteria analysis has been prepared, providing a comprehensive approach to ranking the long list of potential options for safe access and egress. The detailed explanation of methodology and the full analysis of all options is presented in the 'Water Lane Emergency Access and Egress Route Options Appraisal' report.

From the workshops and stakeholder engagement, thirteen potential route options were developed. These route options were considered and first assessed with a pass/fail mechanism in the following categories:

- **Connectivity to safe zones** – assesses whether the route reliably connects the development to designated safe zones.
- **Capacity** – assesses whether the route can accommodate the expected number of evacuees without causing overcrowding.
- **Flood risk impact** – assesses whether the route will remain viable and safe under all flood scenarios and not increase flood risk elsewhere.
- **Impact on emergency response** – assesses whether the route could cause increased pressure on emergency responders.
- **Independent deliverability (or in combination)** – assess the acceptability of the distance that occupants must travel to reach the emergency route from any point within the development, ensuring it is within a reasonable and safe range.

All pass / fail criteria must be passed to proceed, and the remaining options are then ranked based on the scored criteria. Options which failed to deliver independently were reassessed in combination with another option to investigate suitability of combined route concepts.

The options that passed the first stage were assessed for deliverability against the following parameters:

- Land ownership
- Length of route
- Accessibility
- Community acceptance
- Environmental impact
- Aesthetic impact
- Green infrastructure impact
- Carbon impact
- Cost

The options were then ranked; the multi-criteria analysis scoring spreadsheet is presented in Appendix C.

The Trews Weir Elevated Cycle Path option (option 7) was the highest scoring. Table 3-1 below provides the MCA scores for the Trews Weir option.

Table 3-1: Water Lane – Trews Weir – MCA Scores

Criteria	Option 7 score
Connectivity to safe zones	Pass
Capacity	Pass - Connects to relatively accessible safe zone location
Flood risk impact	Pass - perpendicular to flow. New sections need to be elevated, allowing flow beneath
Impact on emergency response	Pass
Deliverable independently or in combination	Pass - most of developable area within 350m of route, there is a small section in the very north which is approximately 530m from the proposed building entrance to the route
Land ownership	3 - ECC, EA and DCC owned land to E of canal, 3rd party within development site
Length of route	3 - 530m from edge of site to safe zone. Total length: 1,375m
Accessibility	3 - Lengthy plus all elevated cycle way or bridge. No issues in egress zone
Community acceptance	3 - Involves construction within Riverside Valley Park (important green space for the city) but ties in with existing bridges. May impact residents along Cotfield St and SW of Water Lane in new development, limited impact on Belle Isle Drive
Environmental impact	4 - Indirect impact of construction materials
Aesthetic impact	3 - Elevated structure over Riverside Valley Park - open access land but may directly impact a few residents. More impact within the development zone from canal to old embankments
Green infrastructure impact	3 - Already good public access in this area to cross canal/river barrier. Will improve this slightly with extra cycle way to tie embankment in with Water Lane
Carbon impact	3 - Construction of 4 new bridges and significant elevated sections
Cost	2 - Construction of 4 new (raised) bridges and significant length of elevated sections

3.5 Conclusions on Preferred Route

The stakeholder engagement, workshops and analysis resulted in the Trews Weir Elevated Cycle Path option emerging as preferred. The option is stand-alone with good public access and connectivity and there are no adverse amenity impacts and limited direct impacts. The land required for this option is mostly in public ownership between Exeter City Council, Devon County Council and the Environment Agency. There are also opportunities to draw on existing funding for maintenance and upkeep of existing crossings.

4 Emergency Access and Egress Route Plan

4.1 Trews Weir Elevated Cycle Path

The preferred emergency access and egress route is shown in Figure 4-1. A 500m buffer is shown around the route to indicate the area that is within approximately 10 minutes' walk of the route. The proposed pedestrian and cycle emergency access and egress route will connect the higher ground along the eastern side of the mainline railway, connecting to the eastern side of the site via an elevated cycle way and a cycle bridge over Water Lane. This crosses the higher ground north of Cotfield Street. The route will exit the site via an openable cycle bridge over the canal, turn south for 100m, then cross the flood relief channel and River Exe via new cycle bridges in approximately the same locations as the existing bridges. This will connect to a dry zone just east of the current Trews Weir bridge, on Belle Isle Drive leading to Trews Weir Reach and hence Topsham Road.

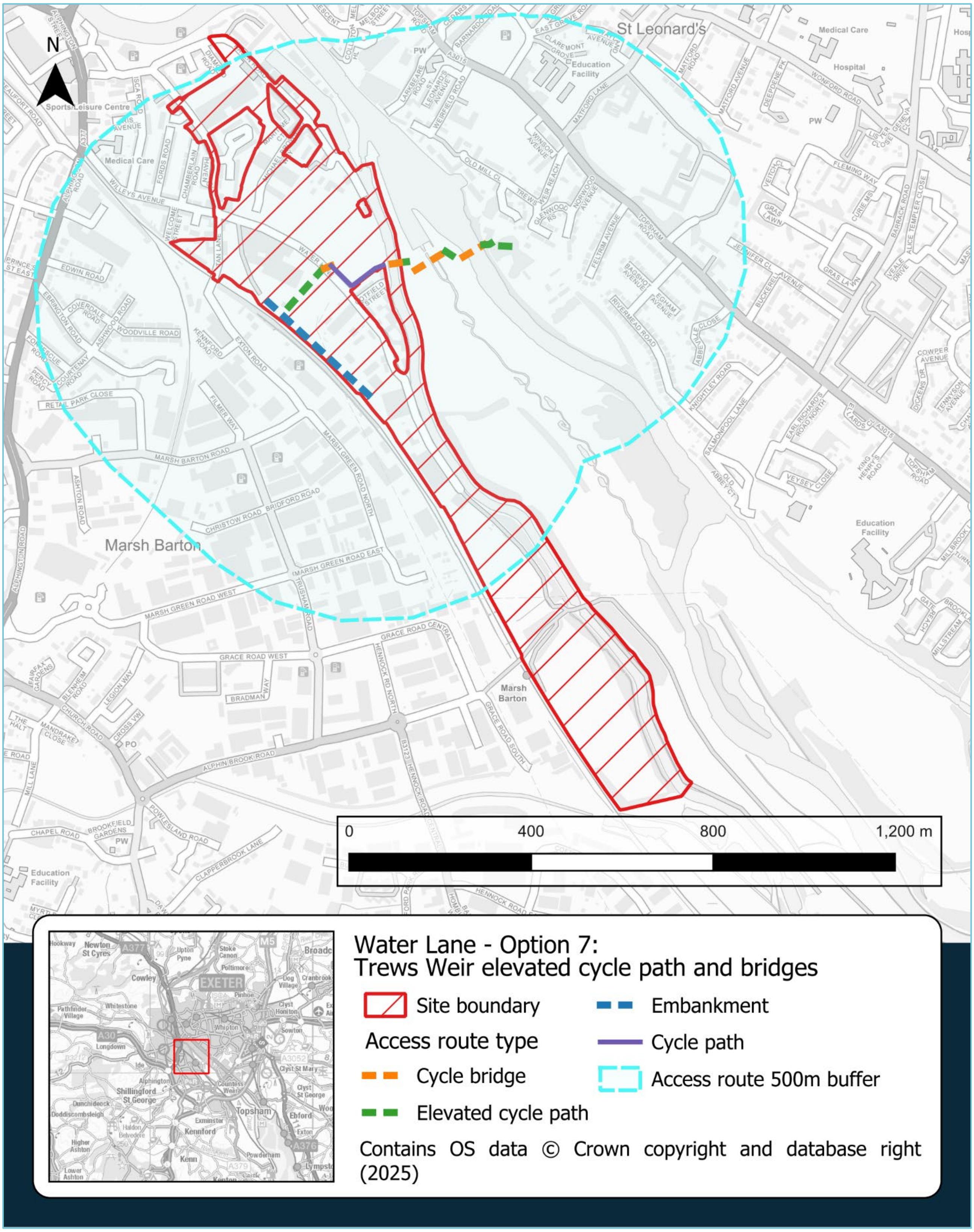


Figure 4-1 - Emergency Access and Egress Route

4.2 Route Description and Concept Design

Water Lane Trews Weir Elevated Cycle Path provides a safe emergency access and egress (EAE) route to the east of the Water Lane development site. It links Exeter Gas Works to Belle Isle Park via the Exeter Shipping Canal, Flood Relief Channel and River Exe. Within the site at the western end of the route, the route uses existing disused railway embankments. To the east of this it uses the elevated cycle path to link to the flood free ground on the old gas storage site. From here it crosses the canal, River Exe flood relief channel and the River Exe channel to the evacuation destination via cycle bridges linked by sections of elevated cycle path. Figure 4-2 shows the proposed route for the Water Lane Option along with the structure types and area serviced by the proposed access.

The existing embankment to the east of the railway line (WL_7 0) runs in a north south direction between the railway line and Water Lane. The embankment is shown to be above the minimum level of 8.9mAOD at this location (the design flood level plus 0.6m) and therefore raising of the embankment is not likely to be required. This embankment forms part of the Water Lane development proposal and will provide access for residents from the development to the elevated cycle path (WL_7 1). The elevated cycle path between the railway embankment and Water Lane (WL_7 1) extends for 135m in a northeasterly direction until it reaches Water Lane. The elevation of the path would need to be approximately 8.1mAOD, which is on average 1.6m above the surrounding ground level here.

The elevated cycle path would connect to a cycle bridge over Water Lane (WL_7 2) which will be approximately 21m long with a minimum span of 13m across the road and a minimum level of approximately 8.5mAOD to allow pedestrian / cycle access to be maintained. Due to cost and space limitations, there is no vehicular access on this route.

Through the Old Gas Works site, the ground elevations are sufficiently high to allow a ground level cycle path (WL_7 3) to be constructed which will connect between the proposed Water Lane and Canal Bridges. There is a raised area of land immediately adjacent to this that is modelled to remain dry during a 1 in 200 AEP flood event.

The Canal Bridge (WL_7 4) will need to be constructed at a minimum elevation of 7.94mAOD (design flood level plus 0.6m at this location). This elevation is very similar to the ground elevation of the Old Gas Works at this location, meaning the bridge will be able to be connected to the path through the Old Gas Works at ground level. This bridge would need functionality to enable passage of boats along the canal (for example by opening or raising) and would be approximately 35m long.

The Canal bridge and Flood Relief Channel Bridge are connected via 45m of elevated cycle path (WL_7 5). The cycle path at this location would need to be at a minimum of 7.94mAOD, resulting in an approximate height of 1.2m.

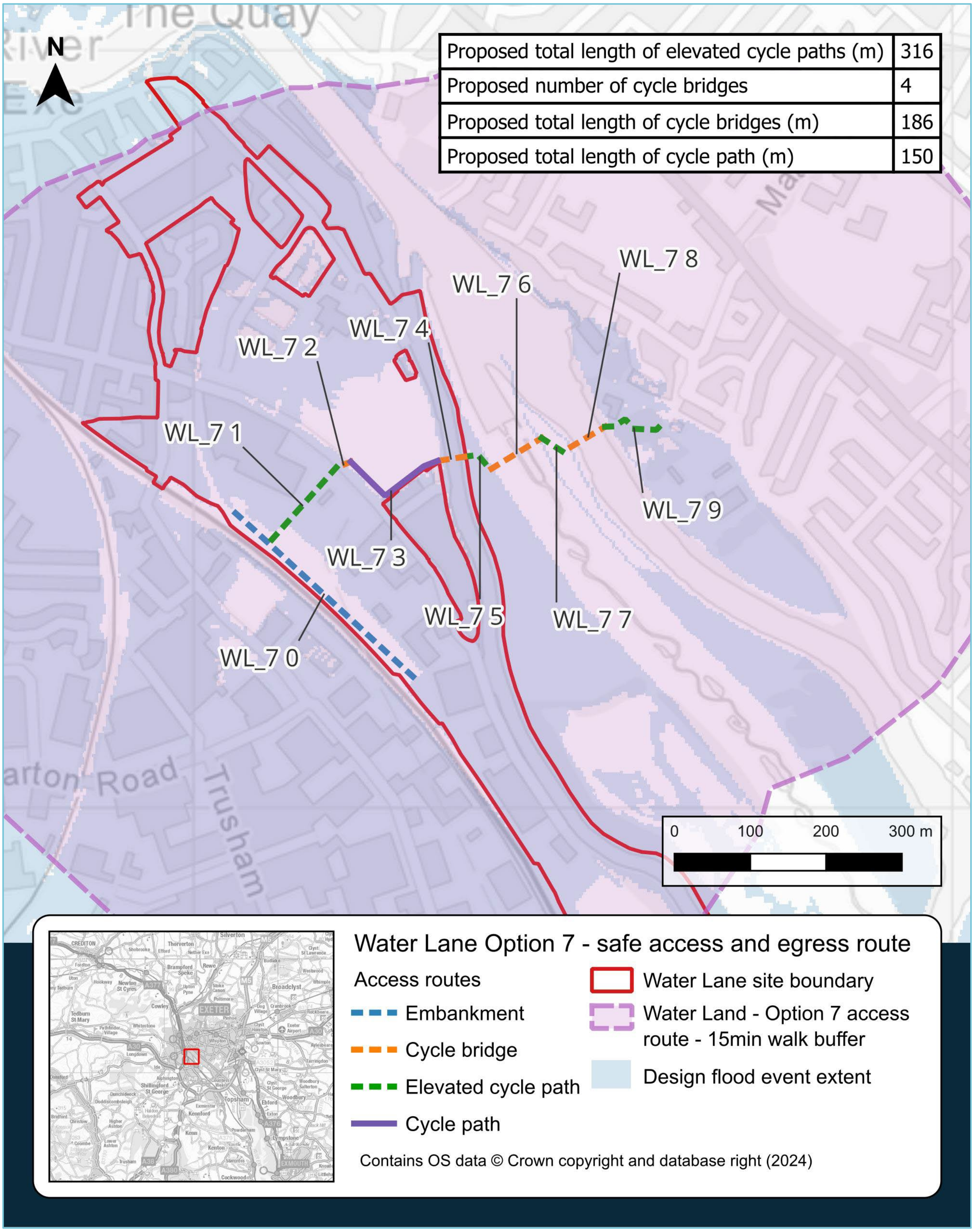


Figure 4-2 - Water Lane Trews Weir Elevated Cycle Path

The Flood Relief Channel Bridge (WL_7 6) will need to be constructed at a minimum elevation of 8.05mAOD (design flood level plus 0.6m at this location). The proposed bridge is 78m long with a total of 5, 15m spans. This would be similar in construction to the existing bridge at this location, but it would be approximately 1.25m higher than this bridge. As a result, it may be possible to re-use some of the existing infrastructure (e.g. foundations here), although this would need to be confirmed through on site investigations.

Connecting the Flood Relief Channel Bridge (WL_7 6) and River Exe Bridge (WL_7 8) will a further 46m section of elevated cycle path (WL_7 7), with a maximum elevation of 8.05mAOD, although this drops to 7.8mAOD adjacent to the River Exe. This results in an approximate height of 1.2m at the western end and 1.65m at the eastern end (the height increasing as a result of a drop in ground elevation towards the east of this section).

The River Exe bridge (WL_7 8) would need to be constructed with a minimum elevation of 7.8mAOD, compared with approximately 7.0mAOD for the existing bridge. As with the Flood Relief Channel Bridge (WL_7 6) it may be possible to re-use some of the existing infrastructure (e.g. foundations here), although this would need to be confirmed through on-site investigations. This bridge would be 52m long and would need a single span of 45m to cross the river without any obstructions.

Finally on the eastern bank of the River Exe there would be a section of elevated cycle path (WL_7 9) connecting the River Exe Bridge (WL_7 8) to Belle Isle Drive which is shown to directly lead to flood free roads during the design flood event. This would be 91m long and would need to have a minimum elevation of 7.76mAOD. This would result in an approximate height of 0.86m dropping to ground level at the eastern end.

4.3 Evacuation Destination

The evacuation destination is the safe zone east of the current Trews Weir Bridge on Belle Isle Drive, leading to Trews Weir Reach and Topsham Road. The area at the eastern end of the route is residential with no through traffic but is less than 200m from the connectivity of Topsham Road (A3015). It is within easy access of the Royal Devon and Exeter Hospital Wonford site.

4.4 Rest Areas

The EAE route is for emergency evacuation, to facilitate the movement of people to safety as quickly as is safe and practicable. However, it has always been intended to serve dual functions of connectivity and active travel. Suitable rest areas with seating along the route could be built in, which could also serve as viewpoint areas with interpretation information. Along the route, raised ground located adjacent to the ground level cycle path is free from modelled flood extents and may be used as a rest area on route.

4.5 Associated Emergency Infrastructure

The Water Lane EAE route leads to a safe zone at Belle Isle Drive. This is located close to the critical arterial route of Topsham Road (A3015) providing a link from city centre towards the outer ring road (A379), M5 motorway, Topsham and locations to the east of Exeter. Several bus routes from city centre (routes R, S, J, K, T) operate along Topsham Road.

A number of railway stations are located to the east of the River Exe; Exeter St Davids, Exeter Central, St James Park, Polsloe Bridge, Digby and Sowton, and Newcourt.

The Royal Devon and Exeter Hospital (Wonford), Barrack Road, is located close to the safe zone. The Devon and Cornwall Police Station on Paris Street and Exeter Middlemoor Fire Station are both located on the east side of the city.

The site near to the safe zone that could be used as an evacuation centre is located St Leonard's Church of England Primary School, St. Leonards Road.

The associated emergency infrastructure is shown in Figure 4-3 below.

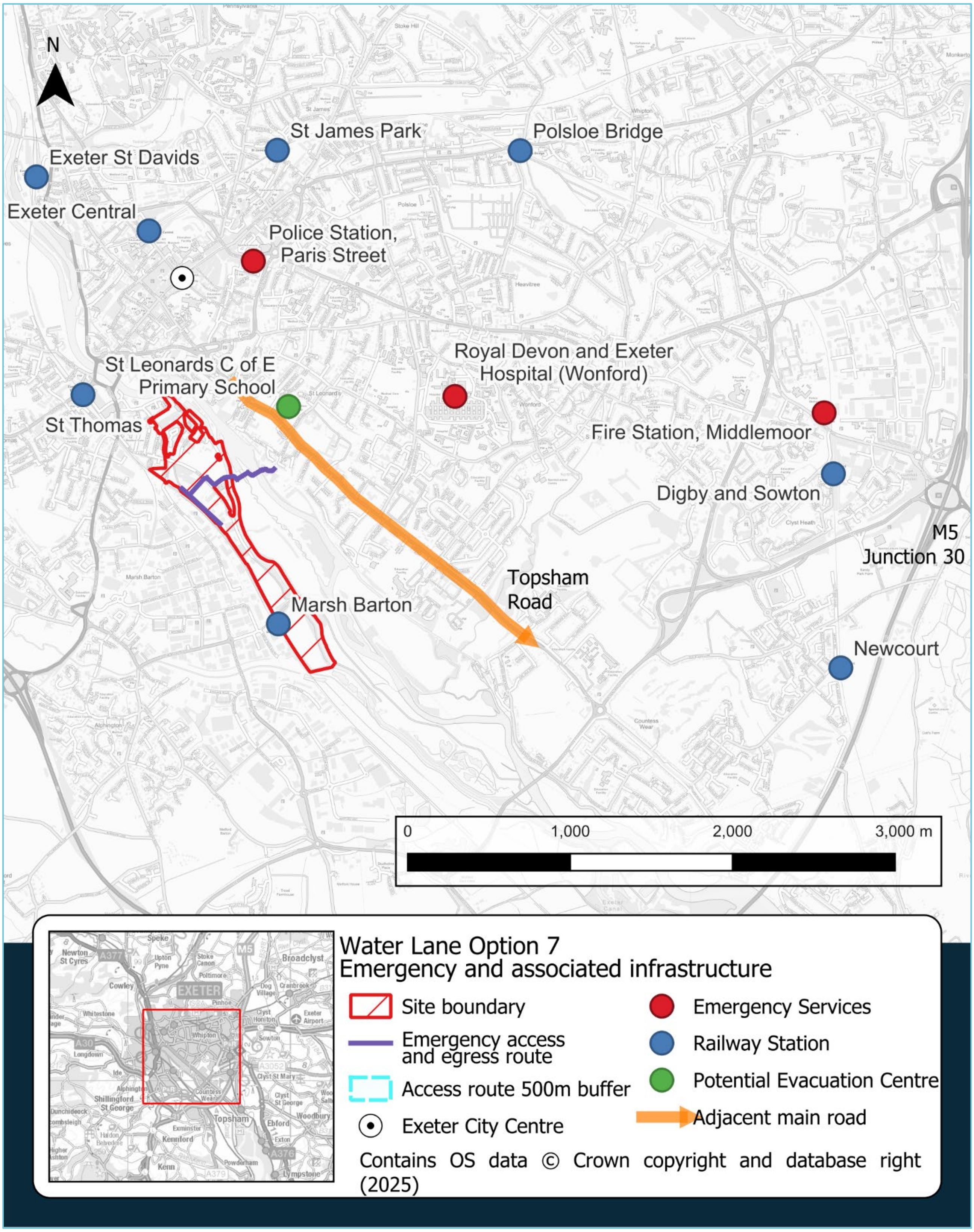


Figure 4-3 - Emergency Infrastructure in Proximity to Water Lane

4.6 High Level Costing

Costing has been approached by consulting a number of sources including Spon's Civil Engineering and Highway Works Price Book, Devon County Council in relation to costs for elevated cycle paths and Exeter City CIL Partial Review 2022 Visibility evidence report. An optimism bias uplift factor of 60% was used in line with FCERM appraisal technical guidance. An assessment of existing pedestrian / cycle bridges constructed in the UK over the last 10 years has also been undertaken as part of this study. Ordnance Survey (OS) mapping has been used to inform the EAE routes and the 1m resolution 2022 composite LiDAR DTM (Digital Terrain Model data has been used to inform existing ground elevations. This provides an indication of the height required for the proposed structures and the amount of ground raising required where there are existing embankments which are below the required level.

Costs have been prepared for key elements of the safe access and egress assessment. These include:

- Cycle / foot paths.
- Elevated cycle paths.
- Pedestrian / cycle bridges.

Within the costs no direct allowances have been included for the installation, servicing or removal, or welfare facilities, site clearance or removal of existing structures. However, where applicable, allowances have been made on top of the construction estimates as follows:

- Site investigations: 10% uplift on construction estimate.
- Demolition and removal: 50% uplift on construction estimate.
- Optimism bias: 60% uplift on construction estimate, preliminary / enabling works and temporary works allowance, inflation, contractors' risk allowance, fee and land purchase.

Table 4-1 provides details of the overall cost estimate for the Trews Weir Elevated Cycle Path access and egress route with allowances for construction estimates, site investigations and optimism bias.

For a more detailed breakdown of costings, please see Appendix D – Water Lane Trews Weir Elevated Cycle Path Costings.

Table 4-1: Water Lane – Trews Weir Elevated Cycle Path - Cost Summary

Element	Percentage	Cost
Civils	N/A	£16,562,000
Construction estimate	10% of civils sub-total	£1,657,000
Site investigations	5% of civils sub-total	£576,000
Optimism bias	60% of all costs	£11,276,000
Grand total	N/A	**£30,071,000**

4.7 Concept Drawings

The following concept drawings of the Trews Weir Elevated Cycle Path illustrate the preferred emergency access and egress route for Water Lane. They show an indicative concept design for the proposed cycle routes and bridge structure over the River Exe. They are intended to provide a visual representation of the route to present how it could be integrated into the surrounding landscape.

The eventual proposed design will need to blend with the surrounding landscape through appropriate design, and the final engineering design would be subject to further consideration of key landscape and environmental sensitivities.

Figure 4-4 shows the route as would be seen from the north-east bank of the River Exe. Figure 4-5 shows a north-west view of the route over the River Exe.

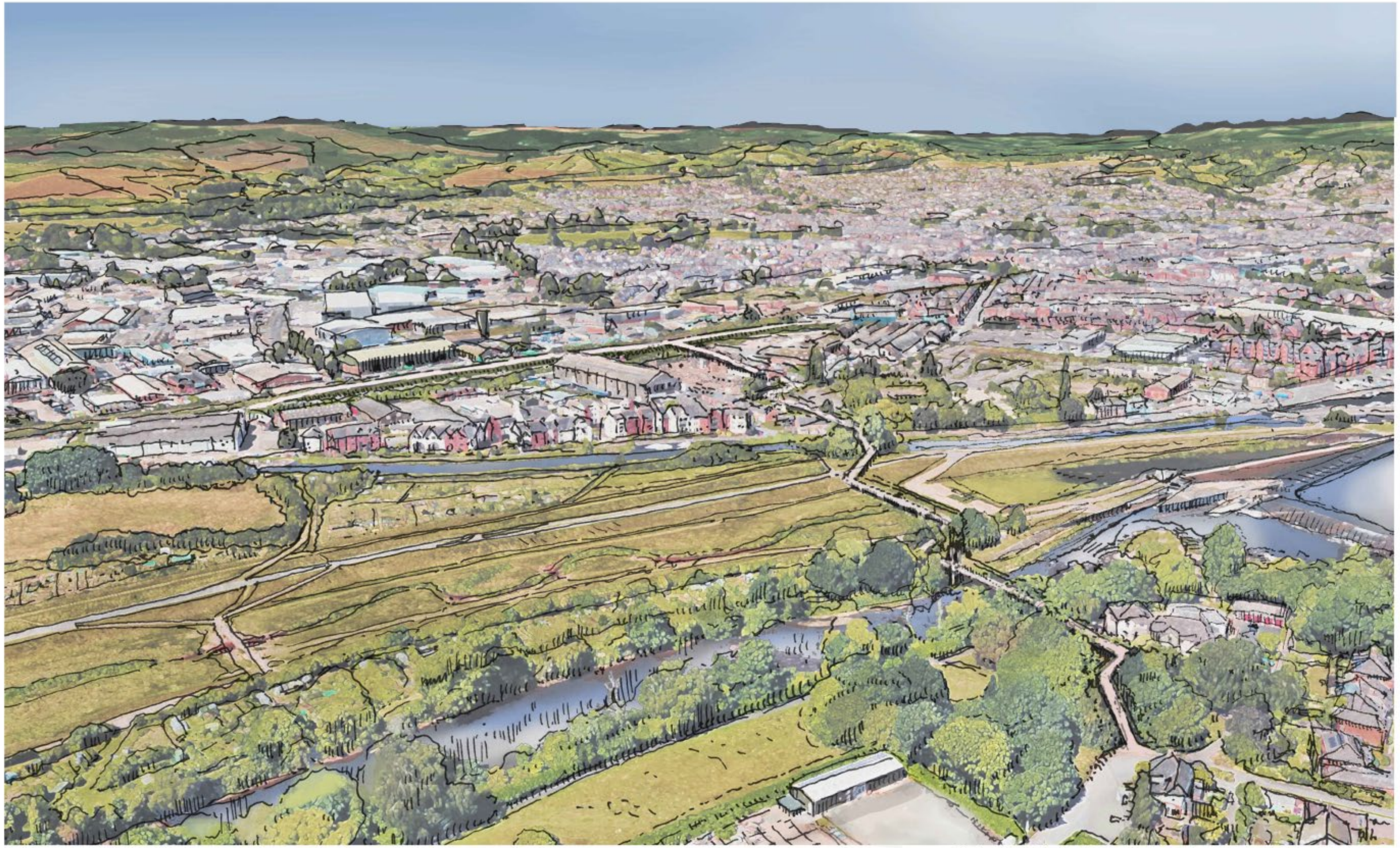


Figure 4-4 - EAE Route Concept Drawing from NE bank of River Exe

Upstream (north west) view over River Exe

2024s0152 Exeter Level 2 SFRA and access appraisal

Exeter City Council

JBA consulting

Figure 4-5 – EAE Route Concept Drawing NW View of River Exe

5 Timeline

5.1 Overview

Phase One: 2024–2025 (Figure 4-1) marks the beginning of the project timeline extending through to 2039. During this initial phase, foundational planning, stakeholder engagement, and preliminary design work has taken place. It is anticipated that fully functional emergency access and egress routes will be in place by 2039, most likely during the 2035–2039 period.

The detailed design phase of 4 to 6 years should begin around 2030. The delivery schedule should align with developer payment plans, which may be linked to specific milestones or phases. Additional works by developers throughout the buildout may also influence the overall delivery timeline.

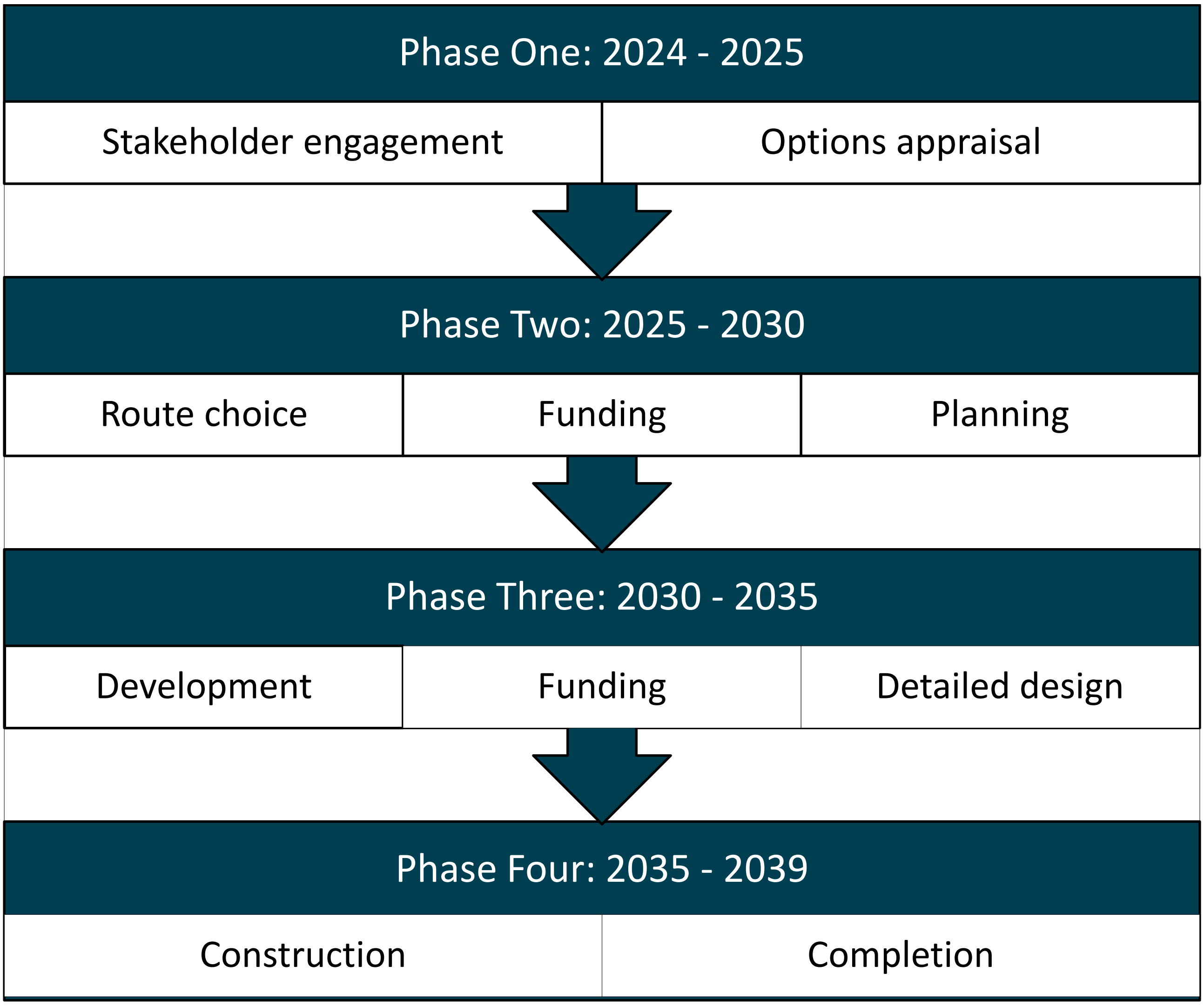


Figure 4-1 - Project Phases

5.2 Funding

The funding window will run concurrently with the planning and development phases until 2035. This should allow for the formulation of a funding strategy and business plans identifying potential partners and grants, developing engagement strategies, and coordinating efforts with partner organisations.

5.3 Construction / Development

The development of the route should follow a structured and phased approach to ensure timely delivery and cost efficiency. This project will move from concept design through outline to detailed design. High standards of quality and safety should be adhered to throughout the construction process, with control metrics in place. Effective stakeholder engagement will be vital to the construction and delivery process. Strong project management will be required to ensure the route is delivered within a specified timeline and budget, maintaining clear communication with the client and other stakeholders. Delivery will need to include all necessary permissions and ensure compliance with planning regulations and environmental legislation.

Provision should also be made for inspection and maintenance of the route once the project has been delivered.

6 Conclusion

The Emergency Access and Egress (EAE) Route Plan for Water Lane forms a vital part of Exeter City Council's strategy to safely and sustainably redevelop one of the city's most prominent brownfield sites. Located predominantly within Flood Zone 3 and subject to multiple sources of flood risk, Water Lane presents an important opportunity to embed resilience at the heart of urban regeneration. This plan sets out a comprehensive assessment of emergency evacuation needs, with detailed analysis of flood risk, accessibility constraints, community impact, and long-term viability. The Trews Weir Elevated Cycle Path emerged as the preferred solution due to its strong performance against all evaluation criteria, offering an accessible, deliverable, and resilient route to a designated safe zone east of the River Exe.

This preferred route takes advantage of existing elevated structures and public landholdings, while enhancing pedestrian and cycle connectivity through the city. The dual-purpose design not only fulfils emergency planning objectives but also supports wider goals around active travel, sustainable infrastructure, and inclusive amenities. Stakeholder engagement was instrumental in shaping the preferred option, ensuring it reflects local priorities and operational realities. The plan also provides a clear roadmap for future delivery, including high-level cost estimates, a phased timeline for design and construction, and considerations for securing funding and planning approvals.

Phase One (2024–2025) has marked the initial phase where foundational planning, stakeholder engagement, and concept design work has taken place. It is anticipated that fully functional emergency access and egress routes will be in place by 2039, most likely during the 2035–2039 period.

As a key enabler of the Exeter Plan and the Liveable Exeter initiative, the Water Lane EAE route represents a critical step toward a more resilient, greener, and more connected future for Exeter.

A Appendix A - Flood Risk

A.1 Overview

The site is at high risk of fluvial flooding, high risk of surface water flooding, varying risk of groundwater flooding and low risk of flooding as a result of a reservoir or canal embankment failure.

The principal watercourse in the vicinity of the site is the River Exe, located along the eastern boundary. There is an embankment defence along the east bank of the Exeter Ship Canal, part of the Exeter Flood Defence Scheme, which provides a design Standard of Protection of a 0.5% Annual Exceedance Probability (AEP) event.

A.2 Fluvial Flood Risk

The Environment Agency (EA) Flood Map for Planning (Figure B-1) indicates that the site primarily falls within Flood Zone 3 and is at high risk from fluvial flooding.

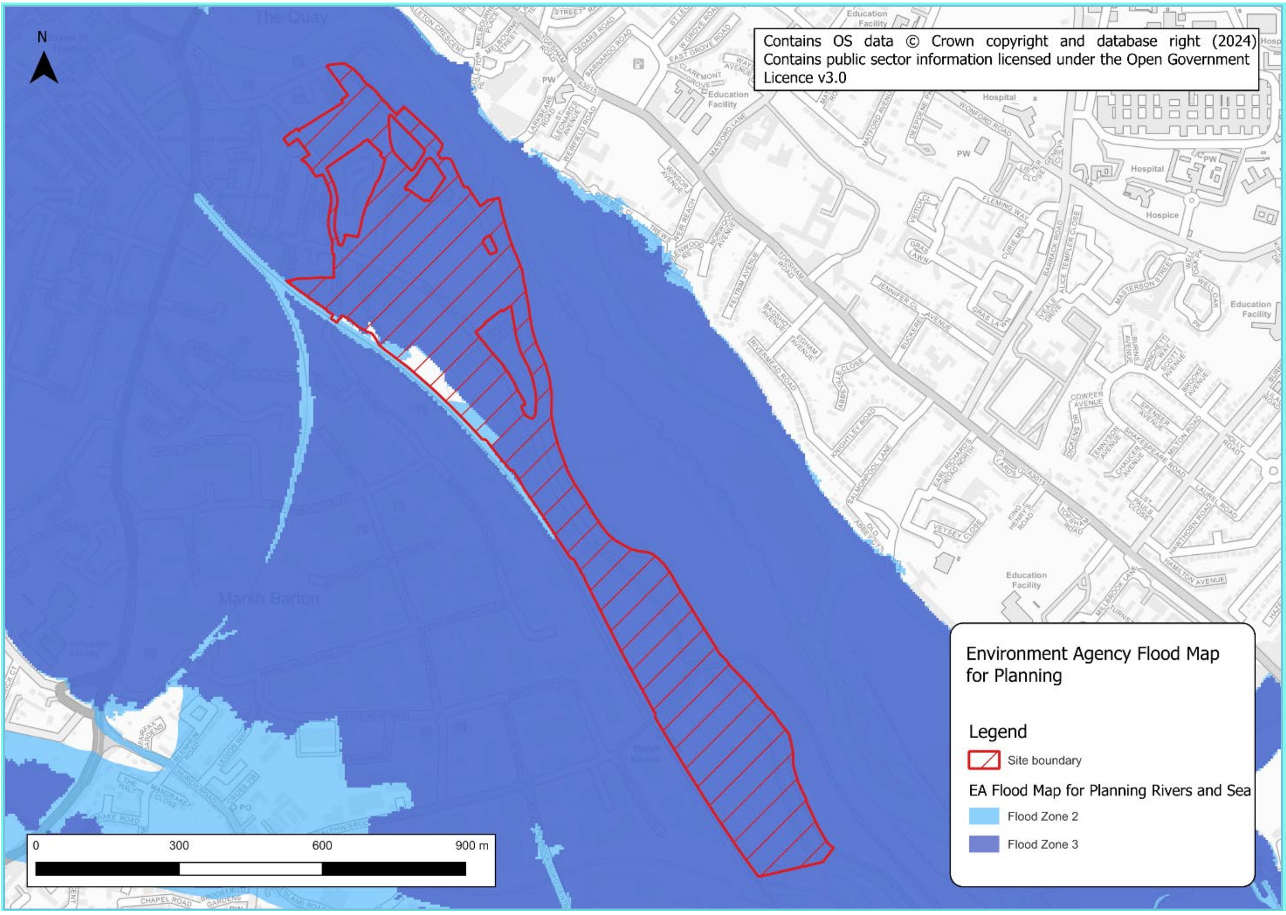


Figure A-1 - Environment Agency's Flood Map for Planning

A.2.1 Fluvial Flood Modelling

The latest version of the River Exe hydraulic model has been used within this study to inform design flood levels. Model updates were completed by JBA Consulting in August 2023 following the construction of the Exeter Flood Defence Scheme. The flood hydrology for the River Exe was also revised for use with the updated hydraulic model. The model was used to produce flood outlines for a range of events for the city to include the latest defences. The model was also run for a range of scenarios including climate change, breaches and operational issues.

For the purposes of this study, the defended 1% AEP event with a 46% climate change uplift (referred to as the design flood event) has been used. This corresponds to the recommended fluvial climate change uplift for the Central allowance during the 2080's epoch in the East Devon Management Catchment[1].

Table A-1 shows the fluvial climate change allowances for the East Devon Management Catchment.

Table A-1 – Fluvial Climate Change Allowance (East Devon Management Catchment)

Epoch	Central	Higher Central	Upper End
2020s (2015-2039)	16%	22%	34%
2050s (2040 to 2069)	24%	33%	55%
2080s (2070 to 2125)	46%	61%	96%

In the design event 84% of the site is flooded. The Exeter Flood Defence Scheme (FDS) saw the construction of Trews flood relief channel and Haven Banks wall, alongside embankments and flood gates in the vicinity of Water Lane. Fluvial breach modelling (based on the failure to close the play park gates on Haven Road) shows more significant flooding, encroaching the site in the north initially, travelling in a southerly direction across the site.

[1] https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgtmcatid=3033

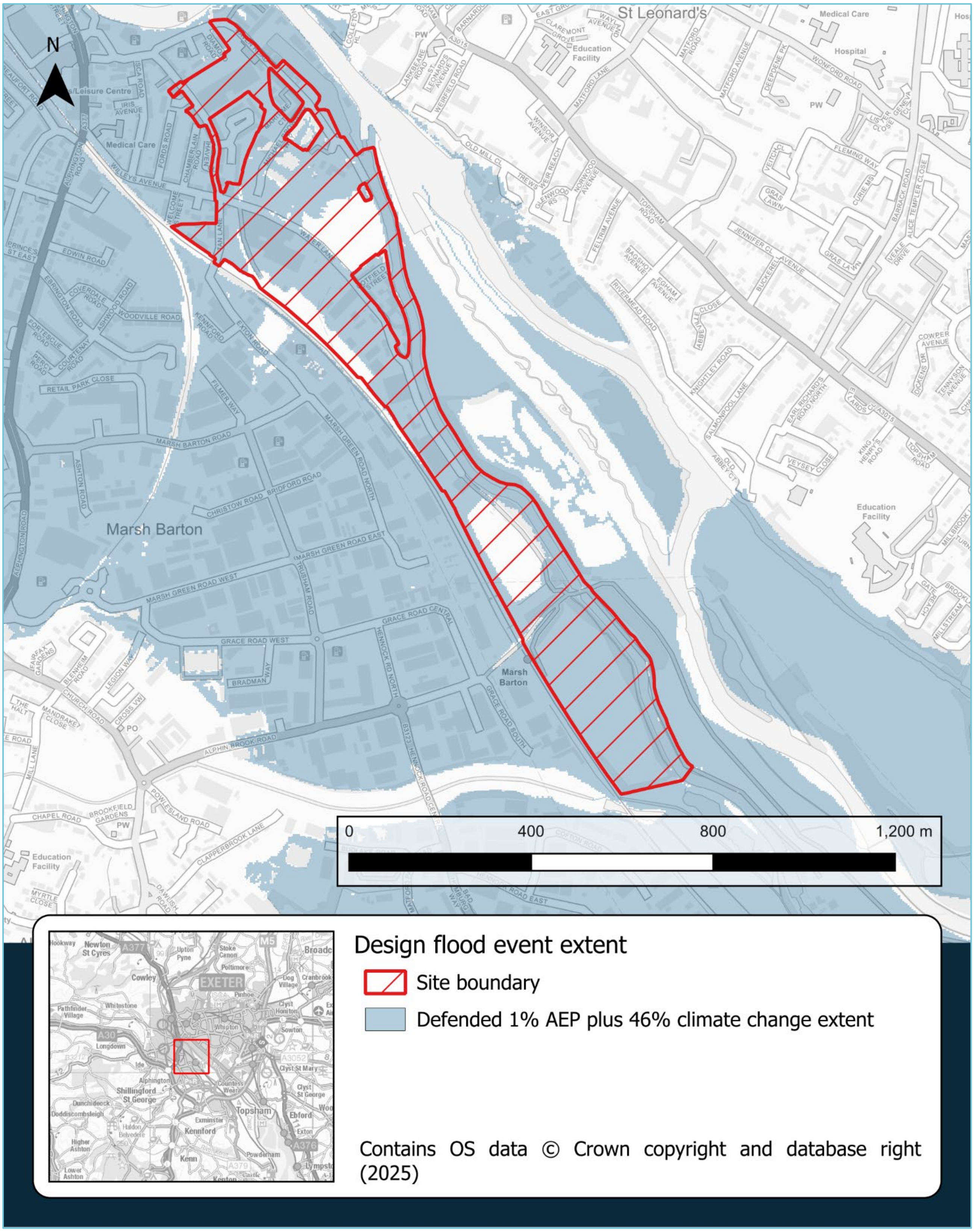


Figure A-2 - 1 in 100 year (1% AEP) + 46% Climate Change Flood Extent

A.2.2 Fluvial Hazards to People

During the 1 in 100 +46% CC event, the site is predominantly at Danger for Most and Danger for All.

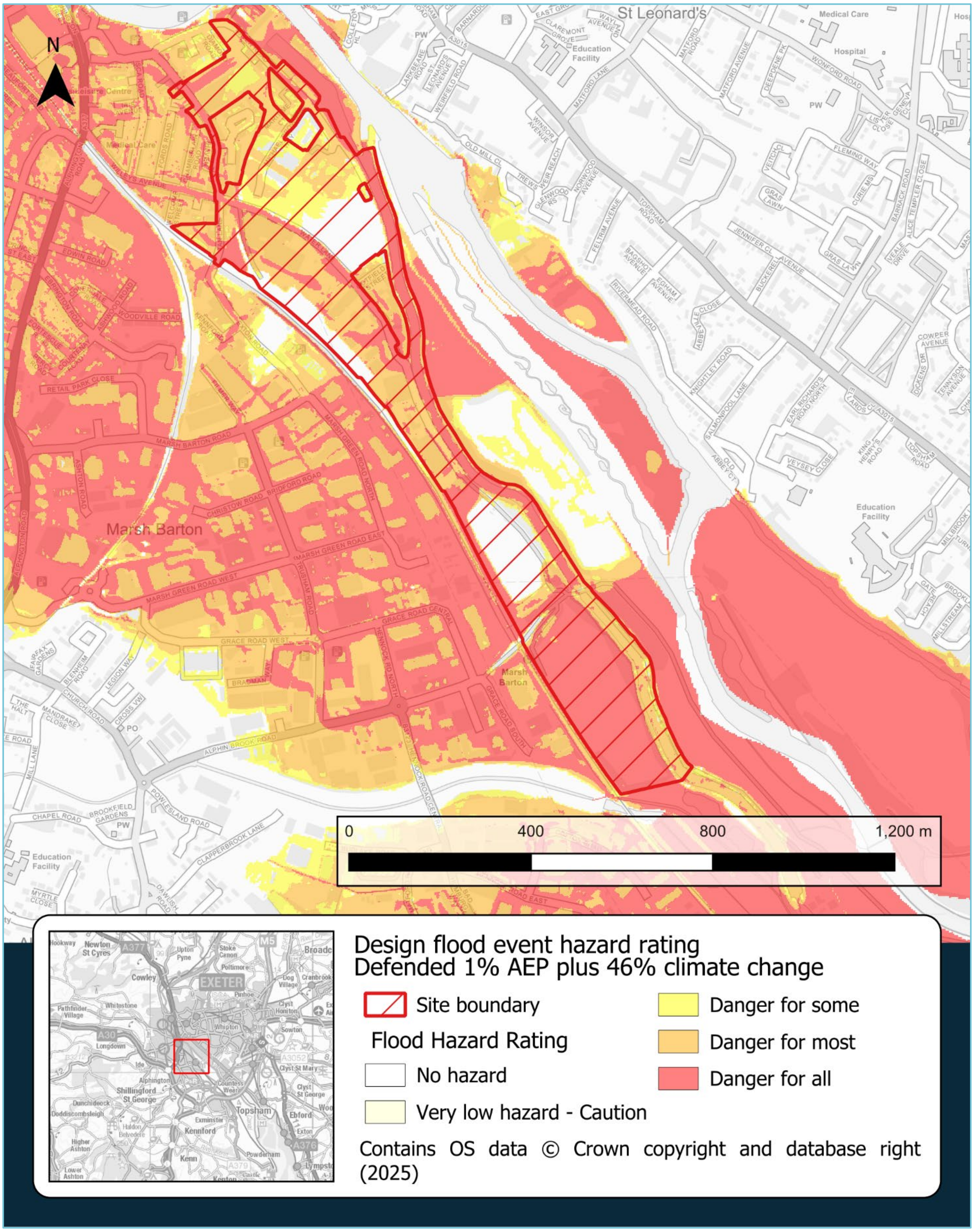


Figure A-3 - 1 in 100-year (1%AEP) + 46% Climate Change Hazard Map

A.2.3 Fluvial Flood Duration

During the 1 in 100 +46% CC event, from the first instance of flooding occurring in the local area, the modelled extent of flooding on-site increases for 15 hours before reaching its maximum depth of 3.54m, which remains for approximately 10 hours before beginning to recede (Figure A-4).

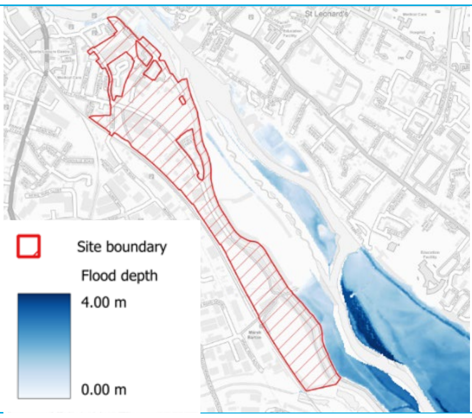
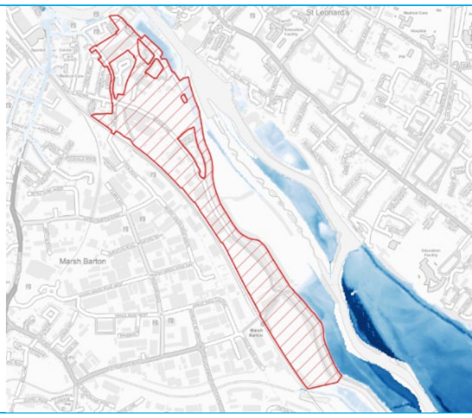
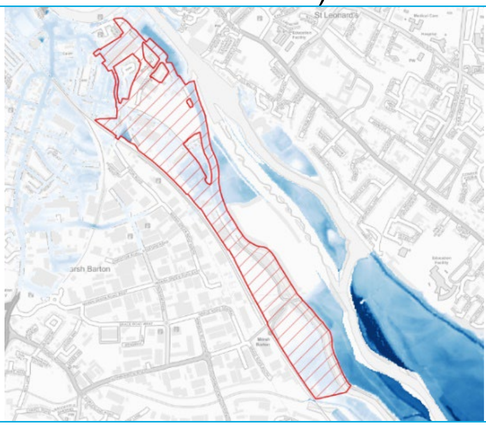
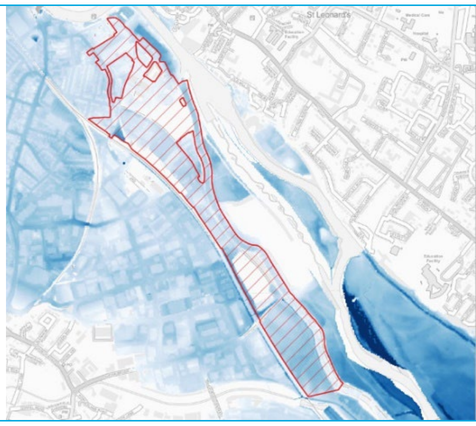
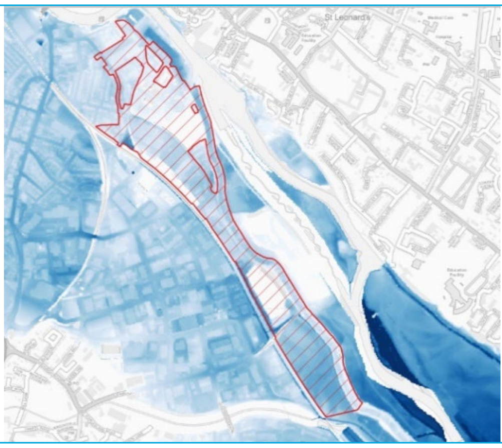
	
+22hr 30 minutes (out of bank flooding first occurs)	+23hr 30 minutes
	
+25hr 30 minutes	+30hr 00 minutes
	
+37hr 30 minutes (max extent)	+47hr 30 minutes (end of model)

Figure A-4 - Modelled Flood Depth Durations at 1% AEP Plus 46% CC

A.3 Surface Water Flood Risk

Surface water flooding arises when rain falling on saturated ground flows overland, following the local topography. Surface water flooding and subsequent overland flow can originate from several sources, for example, surcharging sewers and blocked drains. Surface water flood risk is classified as:

- High – an area has a chance of flooding of greater than 1 in 30 each year.
- Medium – an area has a chance of flooding of between 1 in 30 and 1 in 100 each year.
- Low – an area has a chance of flooding of between 1 in 100 and 1 in 1,000 each year.
- Very Low – an area has a chance of flooding of less than 1 in 1,000 each year.

The Environment Agency's Risk of Flooding from Surface Water (RoFSW) map (Figure B-5) has been consulted to assess flood risk from surface water. This site is shown to be at high risk of flooding from surface water event with mean depths of 1.12m.

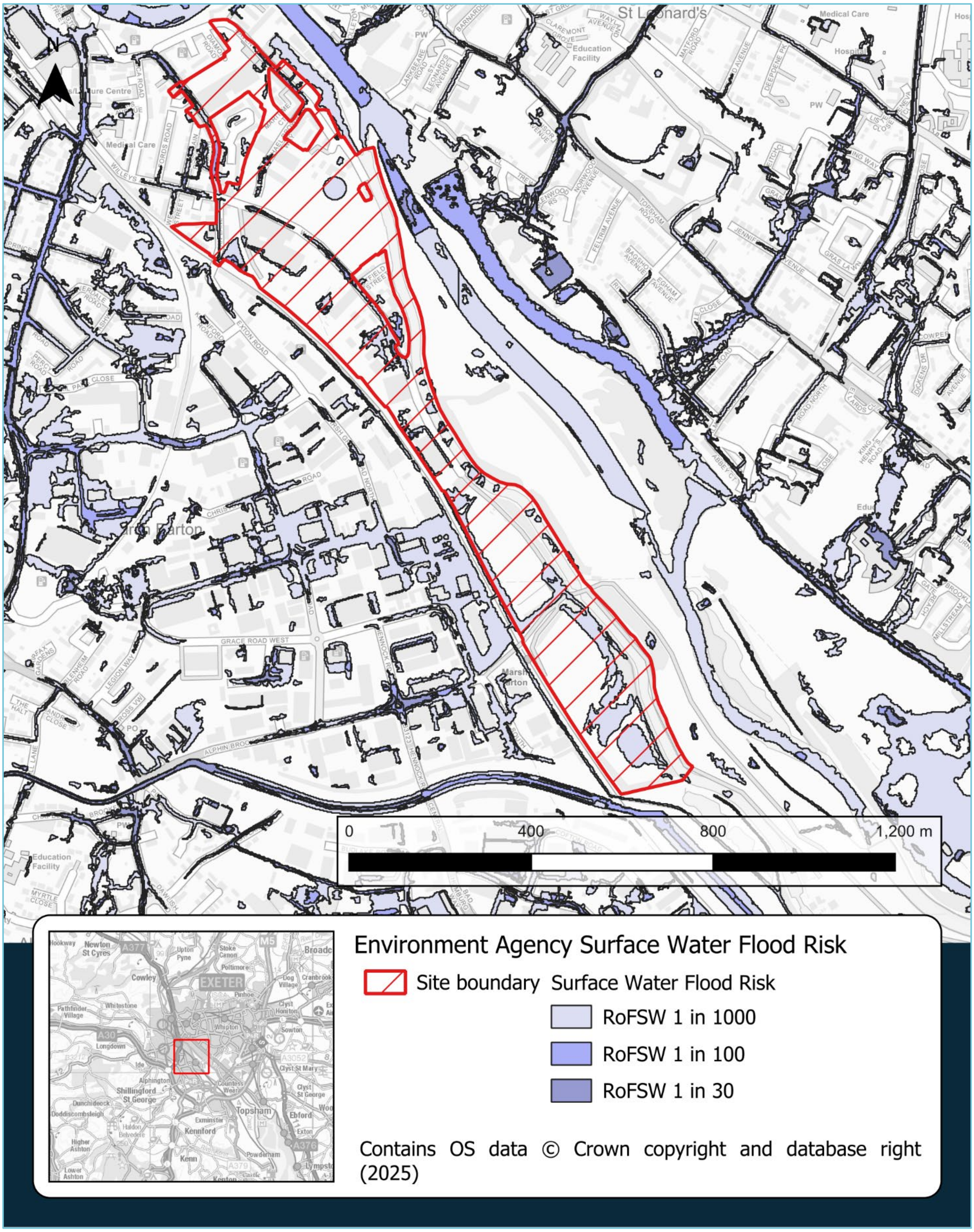


Figure A-5 - Environment Agency's Risk of Flooding from Surface Water Map

A.4 Groundwater Flood Risk

Mapping of groundwater has been based on the JBA Groundwater Emergence mapping dataset. The dataset is a strategic scale map showing groundwater flood areas on a 5m grid and illustrates where groundwater may emerge. The modelling for JBA's mapping involves simulating groundwater levels for a range of return periods (including 75, 100 and 200 years). Groundwater levels are then compared to ground surface levels to determine the head difference in metres. The JBA Groundwater Emergence mapping categorises the head difference (m) into five feature classes based on the 1% AEP model outputs (Table B-2). It is important to note that the modelled groundwater levels are not predictions of typical groundwater levels. Rather they are flood levels, i.e. groundwater levels that might be expected after a winter recharge season with 1% AEP, so would represent an extreme scenario.

It should be noted that the JBA Groundwater Emergence map is suitable for general broad-scale assessment of the groundwater flood hazard in an area, but it is not explicitly designed for the assessment of flood hazard at the scale of a single property. In high-risk areas, a site-specific risk assessment for groundwater flooding is recommended to fully inform the likelihood of flooding. In instances where groundwater is close to the ground surface there can be a significant risk of groundwater emergence. Subsurface development or development requiring deep foundations run the risk of interfering with groundwater levels by displacing water. There is a requirement for site specific investigations to determine the groundwater risk at the crucial points of the route through ground investigations and to determine that proposed construction will not impact the risk posed within the footprint of the route.

The JBA Groundwater Emergence mapping shows that Water Lane is located in categories 2 and 3 in the central area and category 4 in the south of the site. The north of the site is identified to be at low risk of groundwater emergence.

Table A-2 – JBA Groundwater Flood Risk Map Categories

Category	Flood depth range during a 1% AEP flood event	Groundwater flood risk
4	Groundwater levels are either at or very near (within 0.025m of) the ground surface	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
3	Groundwater levels are between 0.025m and 0.5m below the ground surface	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
2	Groundwater levels are between 0.5m and 5m below the ground surface	There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
1	Groundwater levels are at least 5m below the ground surface	Flooding from groundwater is not likely.
-	Low risk	This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological conditions.

A.5 Flood Risk from Reservoirs

The latest available EA Risk of Flood from Reservoirs mapping now shows “wet day” and “dry day” reservoir inundation extents. The “wet day” being a reservoir breach at the same time as a 0.1% AEP (1 in 1000-year) river flood (as this is a likely time when a reservoir might fail) and the dry day shows the failure just from the water retained by the dam. This mapping shows that, in the highly unlikely event of a reservoir breach, almost the entirety of the site is at risk from flooding from Wimbleball Lake Reservoir in both the dry and wet day scenarios.

It is important to note that the EA states that its map shows the worst-case scenario and that actual flood extents and depths are unlikely to be as large or deep as those shown within the map. The site should be considered to be at low risk of flooding from reservoirs.

A.6 Environment Agency Warning and Lead Times

The Environment Agency provide a flood warning service, notifying of the possibility of a fluvial flood from the River Exe. This is the most reliable source for predicting a fluvial flood event, with the warnings being suitable on which to base the necessary containment and preparation measures that need to be taken.

Advice for the public on Floodline: 0845 988 1188

Flood Alerts: Name: Lower Exe area

Description: Lower River Exe from Tiverton to Exeter, including Bickleigh and Stoke Canon areas
Code: 113WABTW10
Quick dial: 211024

Flood Warnings: Name: River Exe at Exeter

Description: Low lying parts of Exeter, including St. Davids, Bonhay Road, Exwick, St.Thomas, Alphington and Marsh Barton
Code: 113FWFEXE11
Quick dial: 311003

The Environment Agency aims to provide between 2 and 12 hours lead time between a Flood Alert being issued and possible flooding occurring and a minimum of 1-2 hours lead time for Flood Warnings on rivers.

Table A-3 - Flood Alert and Warning Summary

Flood code	What it means
 Flood Alert	Flooding is possible, be prepared
 Flood Warning	Flooding is expected, immediate action is required
 Severe Flood Warning	Severe flooding and danger to life
Warning no longer in force	Warning has been removed in the last 24 hours

B Appendix B - Accessibility Considerations

The proposed Emergency Access and Egress route must be accessible at all times. These considerations have been taken into account throughout the development of the preferred route option. The pedestrian nature of this route requires that considerations be made for the safety of future residents and members of the public located in the area should a flood event occur.

Consideration must be given to a population’s willingness and ability to efficiently evacuate following the issuing of an evacuation order. Residents may be deterred from evacuating due to uncertainty, inability to determine the need to evacuate, lack of knowledge about evacuation, assumption that one is safe at home, and inability to evacuate even if one feels the need to do so.

There is a need to consider behavioural characteristics which will have a direct impact on the evacuation process – primarily spatial distribution, walking speed and the physical traits of evacuees, all of which may affect the evacuation time. Evacuation capabilities will further vary with differences in age, gender and physical condition. Consideration must therefore be given to walking speeds in relation to emergency evacuation lead times. Particular consideration must be given to elderly, disabled and vulnerable evacuees. Table C-1 shows the average walking speeds by age and gender. Walking speed is affected by low light, with night-time conditions resulting in slower walking speeds (Mizumura et al., 2024).

Early warning is therefore imperative to begin early evacuation with understanding that there may be vulnerable, disabled or elderly evacuees. While there is sufficient lead time, the success of evacuation will be dependent on how risk of flooding is identified and how this is communicated to partners and the public. Measures beyond dependence on EA Flood Warnings must be established to provided resilience to the emergency access and egress plan.

There is no vehicular access for the emergency services on this route. Therefore, agreeing contingency with the local emergency services for emergency situations is essential.

A further recommendation is that safe rest areas with seating be built along the route to afford evacuating residents the opportunity to rest if needed. These could serve as enhancements to the route, tying in with multi-functional use of active travel and spaces for people.

Table B-1 – Average Walking Speeds by Age and Gender

Age range (years)	Walking speed range (ms-1)	
	Female	Male
10-19	1.39 - 1.47	1.40 - 1.47
20-29	1.27 - 1.45	1.24 - 1.44
30-39	1.32 - 1.55	1.19 - 1.48
40-49	1.35 - 1.51	1.34 - 1.41
50-59	1.38 - 1.49	1.22 - 1.41
60-69	1.27 - 1.41	1.18 - 1.30
70-79	1.21 - 1.32	1.07 - 1.19

C Appendix C - Multi-Criteria Analysis

Please zoom in for easier readability

				Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10	Option 11	Option 12	Option 13
				Do Nothing	Flood warning	Temporary structures	Disused railway embankments	Riverside Valley Park elevated cycle path and bridges	Alphin Brook Road embankment	Trews Weir elevated cycle path and bridges	River Exe right bank elevated cycle path	Alphin Brook embankment	Grace Road South and Alphin Brook embankment	River Exe bridge - Maritime Court to Colleton Hill	Combination of Options 5 and 7	Combination of Options 5 and 11
Category	**Criteria**	**Description**	**Measurement**	No emergency evacuation routes or warning provided	Invest in enhanced flood warning and evacuate residents ahead of a flood event	Install temporary emergency access and egress routes ahead of a flood event	Enhanced railway embankments, elevated cycle paths and bridges over Water Lane, the railway line and Tan Lane and Marsh Green Road West roundabout	Elevated cycle path between Clapper Brook Lane East and Salmon Pool Lane with bridges over the Canal, Main River Exe channel & River Exe side channel	Raise Alphin Brook Road between Clapper Brook Lane East and Church Road	Elevated cycle path between Cotfield Street and Belle Isle Drive with bridges over the Canal, River Exe flood relief channel & main River Exe channel	Elevated cycle path between Haven Road and Exe Bridge South, running along the right bank of the River Exe - would require Exe Bridges Option 4	Raised embankment along left bank of Alphin Brook, with railway bridge south of Grace Road South	Raise Grace Road South and embankment along left bank of Alphin Brook	Raised cycle bridge across the River Exe between Maritime Court and Colleton Hill		
Pass/fail Criteria	**Connectivity to Safe Zones (feedback loop if fail - can it be passed with combi-option)**	Assesses whether the route reliably connects the development to designated safe zones that are outside of the flood risk area. **Pass:** Connectivity to area not at flood risk that either has sufficient welfare facilities and resources or is connected to access routes also not at flood risk that connect to areas that provide these.	Pass/Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass Requires Exe Bridges Option 4 - assumed to be delivered with it	Pass	Pass	Pass	Pass	Pass
	Capacity	Assessment of the capacity to easily disperse egressing public from the safe zone to which the route leads along with perceived capacity of the option itself. **Pass**: The route can accommodate the expected number of evacuees without causing overcrowding. **Fail:** The route cannot accommodate the expected number of evacuees without causing overcrowding.	Pass/Fail	Pass	Pass	Fail lower capacity than permanent options, unlikley to connect as widely throughout the site	Pass Connects to easily accessible safe zone location.	Pass Long sections of cycle lane width. Connects to less accessible safe zone location.	Pass 2 lane road. Connects to easily accessible safe zone location.	Pass Connects to relatively less accessible safe zone location.	Pass Would require contraflow at safe zone (Exe Bridges).	Pass Embankment likely to have high capacity, capacity could be restricted by bridge over railway. Connects to easily accessible safe zone location.	Pass Embankment likely to have higher capacity than raised cycle way, road is high capacity. Connects to easily accessible safe zone location.	Pass Steep, narrow residential road at egress point.	Pass 5: Long sections of cycle lane width. Connects to less accessible safe zone location. 7: Connects to relatively less accessible safe zone location.	Pass 5: Long sections of cycle lane width. Connects to less accessible safe zone location. 11: Steep, narrow residential road at egress point.
	Flood Risk Impact	Consideration of factors leading to higher impact on the flow routes of flood water for example solid barriers to flow (raised roads or embankments), barriers perpendicular to flow or along constricted flow paths, options with a greater density of supports (such as temporary barriers) **Pass:** The route remains viable and safe under all flood scenarios considered in the SFRA and does not increase flood risk elsewhere **Fail:** The route is at risk of being compromised or becoming impassable under likely flood scenarios or compromises flood risk elsewhere.	Pass/Fail	Pass	Pass	Fail Presuming these are pontoons / on (many) supports allowing flow underneath. EA raised concerns that high quantity urban debris will snag on the supports, blocking flow paths.	Pass	Pass Perpendicular to flow. Will need large spans on long elevated sections to allow flow.	Fail Perpendicular to flow, likely to be embankment blocking main flow path through Marsh Barton. If elevated, allowing flow beneath, multiple access ramps to industrial units will still impact on flow.	Pass Perpendicular to flow. New sections need to be elevated, allowing flow beneath. Much will be (new) bridges.	Fail Running along river bank. Elevated on supports - likely to impact on flow and obstruct debris.	Fail Raised embankment across main flow route draining Marsh Barton, significant impact: will impound flow increasing flood depths to the N and increased flow W to E over railway.	Fail Raised embankment across main flow route draining Marsh Barton, significant impact: will impound flow increasing flood depths to the N and increased flow W to E over railway.	Pass	Pass	Pass
	Impact on Emergency Response	How much emergency access to the area could be hindered by the presence of the option. Whether the option could cause increased pressure on emergency response during a flood event. **Pass:** The route allows emergency services to access developments and does not hinder delivery of duties. **Fail:** The route does not allow emergency services to access developments or obstructs or complicates emergency response.	Pass/Fail	Fail No direct negative impact on operations but will result in high demand on emergency services	Fail Will demand emergency response to facilitate the evacuation, then to deal with those who did not follow instructions	Fail Significant resourcing needed for installation and stewarding	Pass	Pass	Pass Poor connectivity to N of site, so will rely on other options to serve the N. Minimum distance to route: 300m from S edge of residential area. Max distance: 1500m.	Pass	Pass Would require contraflow at safe zone (Exe Bridges).	Pass	Pass	Pass	Pass	Pass
	Deliverable independently?	Assesses the acceptability of the distance that occupants must travel to reach the emergency route from any point within the development, ensuring it is within a reasonable and safe range. Calculation based on JBA Emergency Access/Egress Literature Review. Maximum distance to route stated in text below Pass/Fail rating. Pass: under 500m to access Fail: over 500m to access		Pass	Pass Exiting via Water Lane & Alphington Rd in the N, or via Alphin Brook Rd in S	Pass 250m	Pass 400m. Good along W edge of residential section. Connection to S half of site dependent on developers extending raised road from embankment. 350m to S extent of route from the S extent of residential boundary on N edge of solar farm. 1100m to S boundary of site.	Fail 1520m. Poor connectivity to N of site, so will rely on other options to serve the N.	Fail 1520m to N extremity. Minimum of 350m to S edge of residential zone. Poor connectivity to N of site, so will rely on other options to serve the N.	Pass Most of the developable area within 350m of route, there is a small section in the very north which is approximately 530m from the proposed building entrance to the route. Central to residential (northern) area. Poor connectivity to S of site, however from solar farm S this is not residential. Above measurements using current location at Cotfield St, however if the canal crossing was at current end of canal basin location, distance to N of site is 420m but distance to S edge residential is 800m. If gas works used, to S edge = 550m, to N edge = 480m.	Fail 800m to S edge of residential area, 1500m to S boundary of site. Poor connectivity to S of site so may require other options to serve the S. Accessible to N section of site, but separated from some of it by canal basin.	Fail 1900m to N extremity, minimum distance to route is 720m from S edge of residential zone. Poor connectivity to N of site so will rely on other options to serve the N.	Fail 1520m to N extremity. Minimum of 350m to S edge of residential zone. Poor connectivity to N of site, so will rely on other options to serve the N.	Fail 1050m to N edge of solar farm, 1700m to S boundary of site. Poor connectivity to S of site so will rely on other options to serve the S.	Pass 440m in middle of the 2 schemes	Fail 660m in middle of the 2 schemes
	Deliverable in combination?	If failed in above category (scheme is not deliverable independently), is there a suitable option for it to be delivered in combination with? Combination option listed.		N/A	N/A	N/A	N/A	See option 12 and 13	No	N/A or see option 12	No	No	No	See option 13	N/A	N/A
Pass/fail overall score				**Fail**	**Fail**	**Fail**	**Pass**	**Fail**	**Fail**	**Pass**	**Fail**	**Fail**	**Fail**	**Fail**	**Pass**	**Fail**
				N/A	N/A	N/A	2	5	5	5	5	5	5	3	3	2
Deliverability criteria	**Land ownership**	Consideration of whether the ownership of the land is going to facilitate development (e.g. compliance, ease of negotiation) or block it (e.g. difficult/no negotation, prohibitive costs). Current land use considered.	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	(NR landowner + multiple other and some unknowns)	ECC, EA and DCC owned land	ECC, EA and DCC owned land	ECC, EA and DCC owned land	ECC, EA and DCC owned land	ECC, EA and DCC owned land	ECC, EA and DCC owned land	Multiple private and/or other landowners involved	ECC, EA and DCC owned land	Multiple private and/or other landowners involved
				N/A	N/A	N/A	1	2	2	4	2	1	1	5	4	3
	Length of route	Assesses the total length of the route to ensure it is not excessively long, allowing evacuees to reach safety within the time available before the flood risk escalates. Scoring: <250m = 5, 250m-499m = 4, 500m-749m = 3, 750m-999m = 2, >1000m = 1	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	1700m from S end residential zone to safe zone. Will need to follow indirect existing roads, rather than more direct routes as offered by many of the constructed options.	1050m from closest part of site to safe zone. 1600m from S extremity of route to safe zone. 1950m from S extremity of residential zone to safe zone.	790m long cycle path, over 650m from site to safe zone.	780m	350m of elevated cycle route/bridge	900m from S end of elevated route, 450m from closest part of site to safe zone.	1000m (starts at edge of site so this is minimum distance). Need to add 700m to closest residential area within site.	1050m	160m	Maximum = 790m Option, (350m Option 7)	790m long cycle path, over 650m from site to safe zone.
				N/A	N/A	2	3	3	4	4	3	3	3	2	3	3
	Accessibility	Assessment of ease of access to the option from areas within the site (i.e. if obstacles to direct access are preser	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A?	Width, access gradients and frequency/visibility of access points, stability could all be issues.	Good accessibility along much of route along embankments, but 3 elevated/bridge sections. Length could be an issue.	All as elevated route or bridges.	Raised road provides good accessibility.	Relatively short route, however all elevated cycle way or bridge. No issues in egress zone.	Length, all as elevated route.	Mostly accessible embankment, however long. All users will need to cross new cycle bridge over railway.	Raised road and embankment provide good accessibility. Length may be an issue, especially when combined with distance to route within the site.	Likely to require high cycle bridge with significant height gain. Steep, narrow residential road at egress point.	Option 11: Likely to require high cycle bridge with significant height gain. Steep, narrow residential road at egress point. Option 7: Relatively short route, however all elevated cycle way or bridge. No issues in egress zone.	Option 11: Likely to require high cycle bridge with significant height gain. Steep, narrow residential road at egress point. Option 5: All as elevated route or bridges.
				N/A	N/A	N/A	3	4	3	4	3	3	3	3	3	2
	Community Acceptance	Perceived impact on residents and local businesses in regard to construction and design (overlooking, overbearir	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A no permanent obstruction / intrusion but concern over effectiveness	N/A no permanent obstruction / intrusion but concern over effectiveness	Will involve some tree felling along embankments, however will likely tidy up some brownfield & industrial areas. Improves active travel connectivity within area.	Involves construction within Riverside Valley Park (important green space for the city) but will not directly impact residents.	Design will need to facilitate ease of access to industrial units (likely difficult gradients within space available).	Involves construction within Riverside Valley Park (important green space for the city) but will only directly impact few residents around Cotfield St and Belle Isle Drive. Ties in with existing bridges.	Little direct impact. Some resistance to access /aesthetics along river side / gentrified quayside area.	Limited direct impact	Potential access concerns to businesses along Grace Rd South	Likely to have high visual impact on scenic quay and river area. Could be an attractive statement feature.	Involves construction within Riverside Valley Park (important green space for the city) but will only directly impact few residents around Cotfield St and Belle Isle Drive. Ties in with existing bridges.	Likely to have high visual impact on scenic quay and river area. Could be an attractive statement feature. Involves construction within Riverside Valley Park (important green space for the city) but will not directly impact residents.
				N/A	N/A	N/A	4	3	3	4	3	3	3	3	3	3
	Environmental Impact	Perceived impact on biodiversity, habitat availability and quality.	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A no direct impact	Will involve some tree felling along embankments. Indirect impact of construction materials for (relatively short) bridges and elevated sections.	Significant size of elevated construction, indirect impact of construction materials. Within Riverside Valley Park (with part managed by Devon Wildlife Trust).	Indirect impact of construction materials, large scale embankment construction. Small scale tree removal along road verges.	Indirect impact of construction materials	Indirect impact of construction materials	Significant scale construction required to raise embankment, limited number of trees need felling for railway bridge.	Significant scale construction required to build / raise embankment	Construction materials for 2 large span bridges	Construction materials for 2 schemes including 2 large span bridges	Construction materials for 2 schemes including large span bridges
				N/A	N/A	N/A	3	4	3	4	2	3	3	2	2	2
	Aesthetic Impact	Perceived impact on aesthetic value of land on which it will be built e.g., tree felling. Consideration of whether the land is already a valued public space with current positive aesthetic value or if it is currently an area with negative aesthetic value.	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	Will involve some tree felling along embankments, however will likely tidy up some brownfield & industrial areas.	Long elevated structure over Riverside Valley Park - open access land and part managed by DWT but will not directly impact residents.	Industrial estate but small scale tree removal along road verges.	Elevated structure over Riverside Valley Park - open access land, but will directly impact few residents.	Gentrified quayside area - may restrict / spoil view.	Will just raise existing embankment.	Will just raise existing embankment.	Significant size of structures in gentrified quay/riverside area - could be opposition.	Significant size of structures in gentrified quay/riverside area - could be opposition. Elevated structure over Riverside Valley Park - open access land, but will directly impact few residents.	Significant size of structures in gentrified quay/riverside area - could be opposition. Elevated structure over Riverside Valley Park - open access land, but will directly impact few residents.
				N/A	N/A	N/A	4	3	3	4	3	3	3	4	4	4
	Green Infrastructure impact	Perceived impact on features that contribute to the community's quality of life. Degree of provision of access to amenity areas and active travel. Potential for impairment of currently accessible, high value public space.	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	Will improve active travel connectivity in the area.	Already good public access to this area. Unlikely to hinder or improve this.	No change in access.	Already good public access in this area. Will improve this with extra bridge over canal to tie in with Water Lane. Benefits from improving W-E connectivity across R. Exe.	Existing good active travel access, scheme may partially restrict this.	Will not alter existing access to foot/cycle path along Alphin Brook. Railway bridge will increase access to open land to W of canal, however this does not connect to other areas as an active travel route.	Will not alter existing access to foot/cycle path along Alphin Brook or Clapperbrook Lane East.	Will increase active travel connectivity to quay amentiy area but there are other existing options within vicinity.	Will increase active travel connectivity to quay amentiy area but there are other existing options within vicinity.	Will increase active travel connectivity to quay amentiy area but there are other existing options within vicinity.
				N/A	N/A	N/A	3	3	2	3	2	2	2	3	2	2
	Carbon Impact	Perceived impact of the scale of construction, scale of works required and nature of materials.	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	Construction of 3 bridges, elevated sections, enhanced embankments.	Large scale construction, with lengthy elevated sections. Can possibly utilise existing foot/cycle bridge over main river but this is narrow and tying elevated section in to existing bridge may be difficult.	Large scale road construction.	Construction of at least 2 new bridges and significant elevated sections.	Large/medium scale construction compared to others	Significant scale construction required to raise embankment	Significant scale construction required to build / raise embankment	Significant scale construction of 2 large span bridges	Significant scale construction of large span bridges	Significant scale construction of large span bridges
				N/A	N/A	N/A	1	2	1	3	3	2	2	1	1	1
	Cost		1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	Land purchasing, 3 new bridges. Long scheme.	Large scale construction, with lengthy elevated sections. Can possibly utilise existing foot/cycle bridge over main river but this is narrow and joining elevated section to existing bridges may be difficult. Swing bridge needed over canal?	Large scale road construction, difficulties tying in with Clapperbrook Lane East bridge.	Construction of at least 2 new (raised) bridges and significant elevated sections. Swing bridge needed over canal?	Large/medium scale construction compared to others. Swing bridge needed over canal?	Significant scale construction required to raise embankment	Significant scale construction required to build / raise embankment plus difficult to tie in raised road to existing Clapperbrook Lane East bridge.	Significant scale construction of 2 large span bridges. Swing bridge needed over canal?	Significant scale construction of 2 schemes including large span bridges. Swing bridge needed over canal?	Significant scale construction of 2 schemes including large span bridges.
	Multiplier (make pass fail and then merge together into new option)						1 Needs other options for accessing the S of the site (however S of site will not be residential development)	0.5 Poor connectivity to N of site, so will rely on other options to serve the N.	Poor connectivity to N of site, so will rely on other options to serve the N.	1 Central to the (northern) residential section of the site, so not reliant on other options		1? Needs another scheme to provide access to N of site.	1? Poor connectivity to N of site, so will rely on other options to serve the N.	1		
Deliverability overall score				**N/A**	**N/A**	**N/A**	**24**	**29**	**26**	**35**	**26**	**25**	**25**	**26**	**25**	**22**
Rank				Fail	Fail	Fail	3	Fail	Fail	1	Fail	Fail	Fail	Fail	2	Fail
Risks/opportunities for delivery							Land ownership third party, crossing of mainline, significant infrastructure impacting on many parties. Potential for temporary structure replacing Marsh Green Rd West cycle bridge, as this is near flood extremity and may possibly flood later (however flood depths are still 1.5m-1.9m in this location).			No adverse amenity impacts. Mostly in public ownership (ECC, DCC and EA) and opportunities to draw on existing funding for maintenance and upkeep of existing crossings, significant infrastructure but with limited direct impacts. May increase active travel W-E across R. Exe barrier (route towards hospital employment hub), thus reducing congestion at Exebridges (Fire		Joint most significant impact on flood risk of all the proposed schemes.	Joint most significant impact on flood risk of all the proposed schemes.	May increase active travel W-E across R. Exe barrier thus reducing congestion at Exebridges (Fire Service in favour of any reduction in congestion here). Potential heritage issues for improving access at Colleton Hill, likely to be third party land ownership here. Insufficient distance between canal bridges?	May increase active travel W-E across R. Exe barrier thus reducing congestion at Exebridges (Fire Service in favour of any reduction in congestion here). Potential heritage issues for improving access at Colleton Hill, likely to be third party land ownership here. Insufficient distance between canal bridges?	May increase active travel W-E across R. Exe barrier thus reducing congestion at Exebridges (Fire Service in favour of any reduction in congestion here). Potential heritage issues for improving access at Colleton Hill, likely to be third party land ownership here.
Reliance on other options		Separate or give weighting/multiplier (e.g. whole score multiplied by 0.6 if needs to be delivered alongside another		No	No	No	Does need other options for accessing the far S of the site (non-residential)	Poor connectivity to N of site, so will rely on other options to serve the N.	Poor connectivity to N of site, so will rely on other options to serve the N.	Central to the (northern) residential section of the site, so not reliant on other options.	Requires Exe Bridges Option 4. Poor connectivity to S of site, so will rely on other options to serve the S.	Poor connectivity to N of site, so will rely on other options to serve the N.	Poor connectivity to N of site, so will rely on other options to serve the N.	Poor connectivity to S of site, so will rely on other options to serve the S.	Combination option	Combination option

D Appendix D – Water Lane Trews Weir Elevated Cycle Path Costings

Water Lane Trews Weir Elevated Cycle Path costs have been calculated using the following criteria:

WL_7 1: Elevated cycle path, 134m long, 3.5m wide - it has been assumed the costs for this will be borne by the developer as this is located within the development site.

WL_7 2: Bridge over Water Lane, 21m overall span with a maximum 13m span between piers, 3.5m wide - it has been assumed the costs for this will be borne by the developer as this is located within the development site.

WL_7 3: Ground level cycle path through old gas works site, 150m long, 3.5m wide - it has been assumed the costs for this will be borne by the developer as this is located within the development site.

WL_7 4: Bridge over the canal, 35m overall span with a maximum 22m span between piers, 3.5m wide. Costs of £106,000 per metre based on bridge construction over water, based on an assessment of existing pedestrian / cycle bridges constructed in the UK over the last 10-years.

WL_7 5: Elevated cycle path, 45m long, 3.5m wide. Costs are based on £2,094.15 per m2, calculated from costs provided by DCC for work undertaken along the River Exe cycle path and adjusted for inflation to September 2024.

WL_7 6: Bridge over the flood channel, 78m overall span with a maximum 15m span between piers, 3.5m wide. Costs of £77,000 per metre based on bridge construction over land, based on an assessment of existing pedestrian / cycle bridges constructed in the UK over the last 10-years.

WL_7 7: Elevated cycle path, 46m long, 3.5m wide. Costs are based on £2,094.15 per m2, calculated from costs provided by DCC for work undertaken along the River Exe cycle path and adjusted for inflation to September 2024.

WL_7 8: Bridge over the River Exe, 52m overall span with a maximum 45m span between piers, 3.5m wide. Costs of £106,000 per metre based on bridge construction over water, based on an assessment of existing pedestrian / cycle bridges constructed in the UK over the last 10-years.

WL_7 9: Elevated cycle path, 91m long, 3.5m wide. Costs are based on £2,094.15 per m2, calculated from costs provided by DCC for work undertaken along the River Exe cycle path and adjusted for inflation to September 2024.

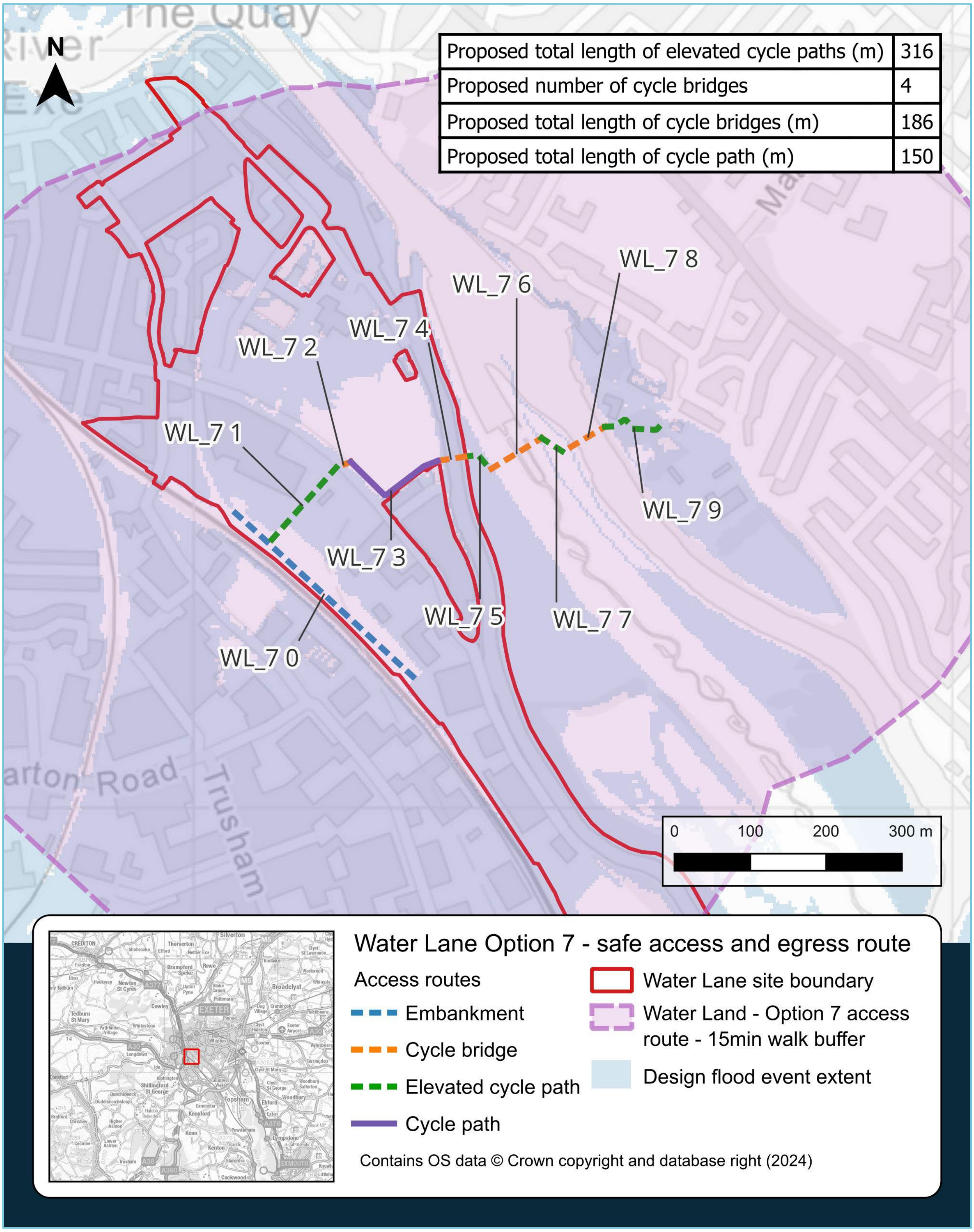


Figure D-1 - Water Lane Trews Weir Elevated Cycle Path

Table D-1 - Water Lane Trews Weir Elevated Cycle Path Access Costs

Structure number	Item number	Description	Route	Unit	Quantity	Rate	Cost	Notes
Elevated cycle/footpaths								
Elevated timber cycle path: Railway embankment to Water Lane								
WL_7 1	1	Elevated timber boardwalk	Water Lane Option 7	m^2	0	£2,094.15	£0.00	134m total length, 3.5m wide. Costs assumed to be borne by developer.
	2	Land purchase		ha	0	£1,200,000	£0.00	
Elevated timber cycle path: Flood relief channel west								
WL_7 5	3	Elevated timber boardwalk	Water Lane Option 7	m^2	157.5	£2,094.15	£329,827.87	45m total length, 3.5m wide. Rate based on costs provided by DCC for boardwalk replacement (inflated from Jan 2022). Land purchase not included as land within Council ownership.
	4	Land purchase		ha	0	£1,200,000	£0.00	
Elevated timber cycle path: Flood relief channel east								
WL_7 7	5	Elevated timber boardwalk	Water Lane Option 7	m^2	161	£2,094.15	£337,157.38	46m total length, 3.5m wide. Rate based on costs provided by DCC for boardwalk replacement (inflated from Jan 2022). Land purchase not included as land within Council ownership.
	6	Land purchase		ha	0	£1,200,000	£0.00	
Elevated timber cycle path: Belle Isle Park								
WL_7 9	7	Elevated timber boardwalk	Water Lane Option 7	m^2	318.5	£2,094.15	£666,985.26	91m total length, 3.5m wide. Rate based on costs provided by DCC for boardwalk replacement (inflated from Jan 2022). Land purchase not included as land within Council ownership.
	8	Land purchase		ha	0	£1,200,000	£0.00	
Cycle/footpath								
Cycle path: Old gas works								
WL_7 3	9	Footpath	Water Lane Option 7	m^2	0	£147.82	£0.00	Tarmacadam surface, 3.5m wide, 150m in length. Includes excavation & type 1 subbase. Cost assumed to be borne by developer.
	10	Land purchase		ha	0	£1,200,000	£0.00	
Cycle/footbridges								
Water Lane Bridge								
WL_7 2	11	Bridge constructed over land	Water Lane Option 7	m	0	£77,000.00	£0.00	21m overall span, max. 13m span between piers, 3.5m wide structural steelwork. Cost assumed to be borne by developer.
	12	Land purchase		ha	0	£1,200,000	£0.00	Land purchase not included as land within development site.
Canal Bridge								
WL_7 4	13	Bridge constructed over water	Water Lane Option 7	m	35	£106,000	£3,710,000.00	35m overall span, max. 22m span between piers, 3.5m wide structural steelwork. Costs are detialed in the 'Costing assumptions' tab.
	14	Land purchase		ha	0	£1,200,000	£0.00	Land purchase not included as land within Council ownership.
Flood Relief Channel Bridge								
WL_7 6	15	Bridge constructed over land	Water Lane Option 7	m	78	£77,000	£6,006,000.00	78m overall span, max. 15m span between piers, 3.5m wide structural steelwork. Costs are detialed in the 'Costing assumptions' tab.
	16	Land purchase		ha	0	£1,200,000	£0.00	Land purchase not included as land within Council ownership.
River Exe Bridge								
WL_7 8	17	Bridge constructed over water	Water Lane Option 7	m	52	£106,000	£5,512,000.00	52m overall span, 45m span between piers, 3.5m wide structural steelwork. Costs are detialed in the 'Costing assumptions' tab.
	18	Land purchase		ha	0	£1,200,000	£0.00	Land purchase not included as land within Council ownership.
						Civil sub-total	£16,561,970.52	

Costs Summary: Water Lane - B				
	Construction estimate		£16,561,971	
	Site investigations	10%	£1,656,197	
	Demolition and removal	5%	£575,900	
	Prelims / Enabling Works	0%	£0	
	Temporary Works Allowance	0%	£0	
	Contractors Risk Allowance	0%	£0	Typical Contractor held risks
	Fee	0%	£0	Contractor's fee
	Land purchase	£1,200,000	£0	Land purchase value based on brownfield site from Viability evidence Document 2 – March 2022. All land assumed to be in public ownership or within development sites therefore costs assumed to be £0.
	Optimism bias	60%	£11,276,441	Cost uncertainty
		Grand Total	**£30,070,508**	

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