

Red Cow Provisional Emergency Access and Egress Route Plan

Final

Version 3.0

Date: September 2025

Prepared for: Exeter City Council



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Revision History

Issued Date	18 th September 2025
Issued to:	Jill Day
BIM Reference	MHI-JBA-XX-XX-TN-Z-0001-S3-P02
Revision History	Minor revisions
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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.

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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
FFL.....	Finished Floor Levels
FRA.....	Flood Risk Assessment
FRP	Flood Response Plan
JBA.....	Jeremy Benn Associates
MCA	Multi-Criteria Analysis
NPPF.....	National Planning Policy Framework
PFR.....	Property Flood Resilience
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 in 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 Red Cow

Red Cow is one of the three strategic scale brownfield sites identified in the emergent Exeter Plan as suitable for mixed use redevelopment and presents an exciting and unique development opportunity. Red Cow village has a rich historical past, and this provides an opportunity to create an impressive and memorable gateway to Exeter, imbuing a sense of arrival and vibrancy with a strategic transport hub. It is well suited to deliver a low carbon, low car neighbourhood that optimises public transport, active travel and shared mobility, with a focus on the strategic principles of the Exeter Plan, including increased opportunities for walking and cycling.

As the site is almost entirely located in Flood Zone 3, it is imperative that inclusion of safe emergency access and egress is factored into the strategic planning phase. After in depth deliberation and review, including a multi criteria options appraisal, the preliminary preferred emergency access and egress route option for Red Cow has been identified.

This Route Plan describes the strategic emergency access and egress route for Red Cow 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 Red Cow and its relationship with the other two sites, Water Lane and Exe Bridges, for which emergency access and egress route plans are being developed.

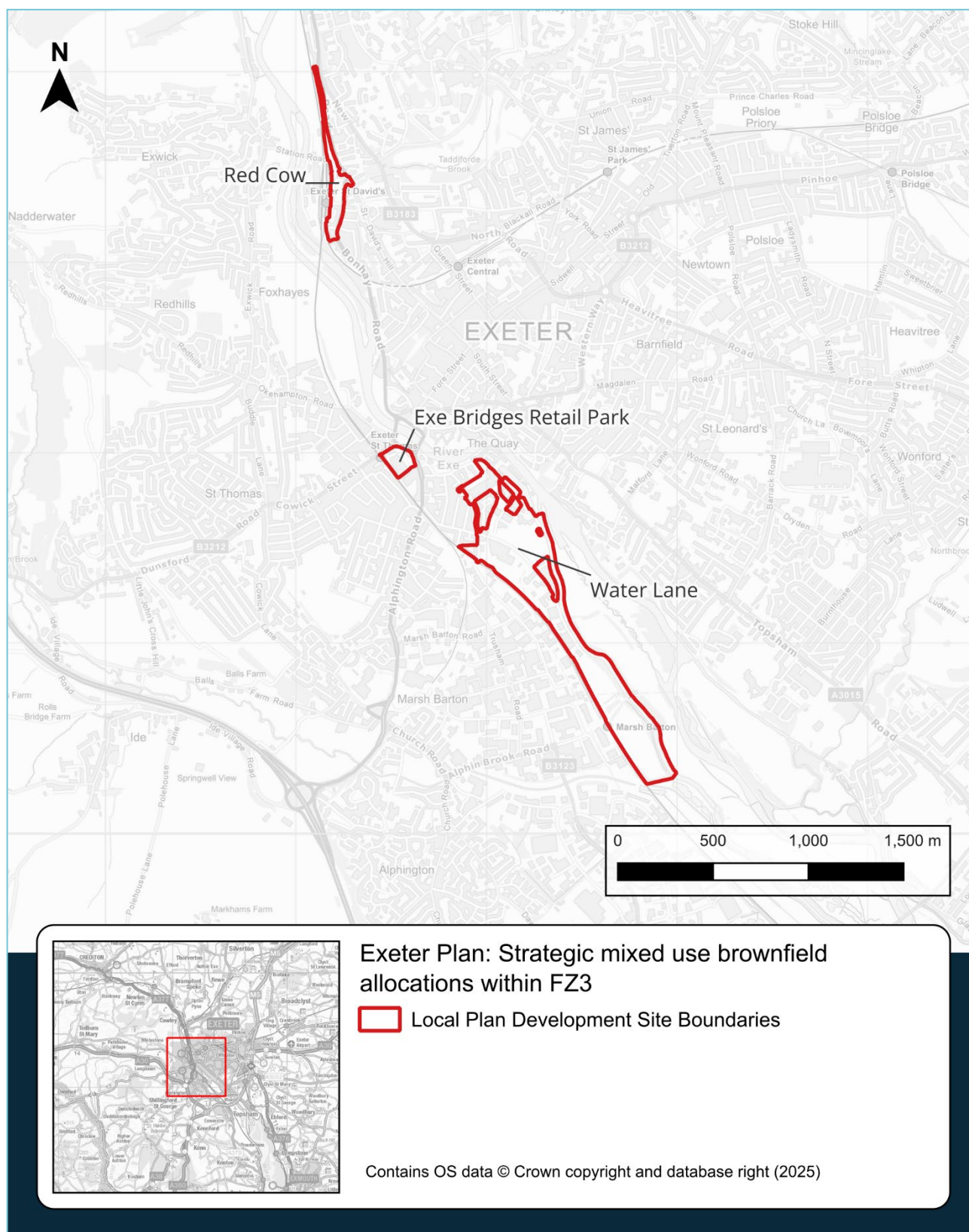


Figure 1-1 – Exeter Plan Site Locations

2 Context and Plan Background

2.1 Aim

Red Cow 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 preliminary Emergency Access and Egress Route Plan (EAERP) presents the preferred strategic access and egress route for the Red Cow strategic mixed use brownfield allocation. It aims to demonstrate the potential of 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 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 Red Cow Options Appraisal document. These investigations have informed the preferred route for safe emergency access and egress. This Route Plan presents the process followed to decide the preferred emergency access and egress route, detailing each stage, with 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. Red Cow is a 3.8 hectare site that has been identified in the Exeter Plan as suitable for a strategic mixed-use development. The site is adjacent to Exeter St. Davids railway station to the west and the A377 comprising Cowley Bridge Road and Bonhay Road to the east. It is a 15-minute walk from the City Centre.

2.3.2 Site description

The site includes a mixture of residential buildings, surface car parking areas, commercial, industrial buildings, student accommodation, leisure and some retail units. Its topography is largely flat with elevations ranging from 5m AOD to 9m AOD.

The River Exe lies within a minimum distance of approximately 80m from the closest point to site and a maximum distance of approximately 200m, off the western half of the site, on the other side from St David's railway station and railway lines. The main line railway from London to Exeter to Penzance forms the western boundary of the site.

2.3.3 Existing Access

Access to the site is gained from the north-by the A377 Cowley Bridge Road, which serves as the eastern boundary of the site, and exits to the south as A377 Boorhay Road. The A377 also exits to the east as St. Davids Hill. Vehicular access from the west is only possible via the Station Road level crossing of the main line railway. Pedestrian and cycle access is currently possible through existing thoroughfares but there are no designated cycleways.

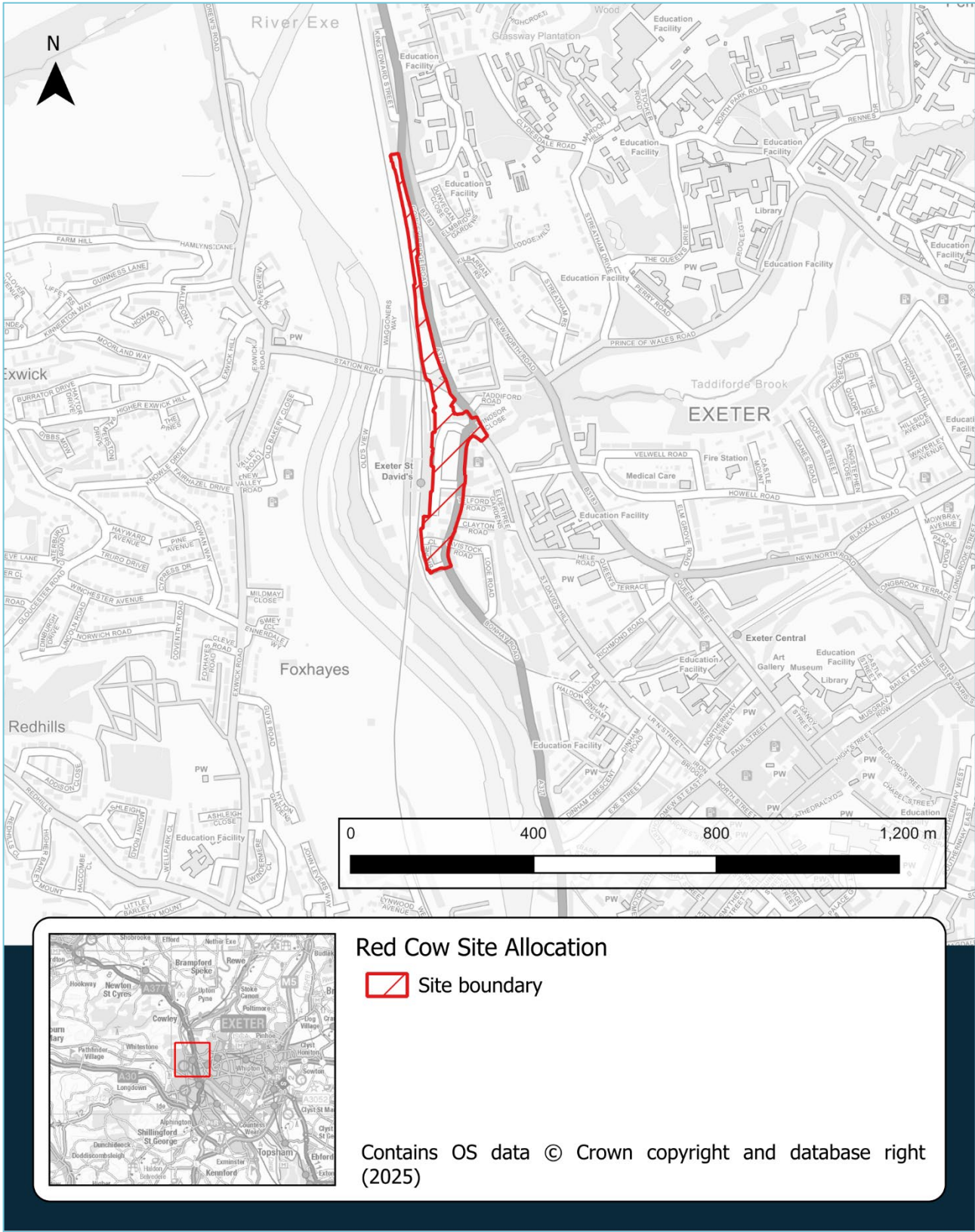


Figure 2-1 – Red Cow Site Allocation

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 River Exe, part of the Exeter Flood Defence Scheme, which provides a Standard of Protection to withstand a 1 in 200 annual exceedance probability event. The site is situated primarily in Flood Zone 3a.

Access and egress remains available via St David's Hill in the design fluvial event (1% AEP plus 46% CC) and the design surface water event (1% plus 65% CC).

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

2.5 Lead and Warning 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 Red Cow 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 the beginning of a fluvial event occurring however, warning times could be very short.

From initial out of bank flooding occurring in the Red Cow area, there are a further 2 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 Red Cow 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 aid in allowing 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 Red Cow 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 EP 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 • 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 'Red Cow Emergency Access and Egress Route Options Appraisal' report.

From the workshops and stakeholder engagement, 10 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.

Those 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 Red Cow Elevated Cycle Path option (option 9) was the highest scoring. Table 3-1 below provides the MCA scores for the elevated cycle path option.

Table 3-1: Red Cow - MCA Scores

Criteria	Option 9 score
Connectivity to safe zones	Pass.
Capacity	Pass.
Flood risk impact	Pass - Largely parallel to flow. Elevated so allows flow, supports may well catch urban debris so will need to be well spaced. Access ramps may create barriers.
Impact on emergency response	Pass.
Deliverable independently or in combination	Pass - Maximum distance to scheme = 55m with extension of scheme to S section of site.
Land ownership	4 - All within development zone, National Rail land (car park) within the S section of development site.
Length of route	3 - Longest = 665m (N section), 245m (S section).
Accessibility	4 - Easy access from within the site. Raised cycleway will require access ramps. Good access to safe zone.
Community acceptance	4 - N section is currently brownfield, awaiting redevelopment. S section is carpark - little aesthetic appeal but requirement to retain function and capacity as station car park.
Environmental impact	5 - Indirect impact of construction materials only, no direct impact on habitat. Currently brownfield site / car park.
Aesthetic impact	5 - Currently brownfield, awaiting redevelopment and station car park (ideally will not be an eyesore for travellers arriving in Exeter).
Green infrastructure impact	4 - Will provide an important link from the N end of the site to St Davids Hill and station, avoiding Cowley Bridge Rd. Does not connect onwards to the N.
Carbon impact	3 - Medium / large length elevated construction.
Cost	3 - Medium / large length elevated construction.

3.5 Conclusions on Preliminary Preferred Route

The stakeholder engagement, workshops and analysis resulted in the Red Cow Elevated Cycle Path emerging as preferred at this stage. It would provide a safe access and egress route to the east of the Red Cow development site linking from the north and south of the site to St. David's Hill and the station roundabouts. However, further engagement and analysis will be required before any planning work can begin for this site. Opportunities should be sought to work closely with developers and landowners to further refine potential routes, incorporating the qualities of the Exeter Plan such as active travel and green infrastructure.

4 Emergency Access and Egress Route Plan

4.1 Emergency Access and Egress Route

The 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 Red Cow elevated cycle path emergency access and egress route would connect the north of the site with Station Road via a cycle bridge. From there the elevated cycle path continues to the south to reach a cycle bridge over Isambard Parade which extends east, dropping down to ground level next to the A377 Bonhay Road / St. David's Hill junction.

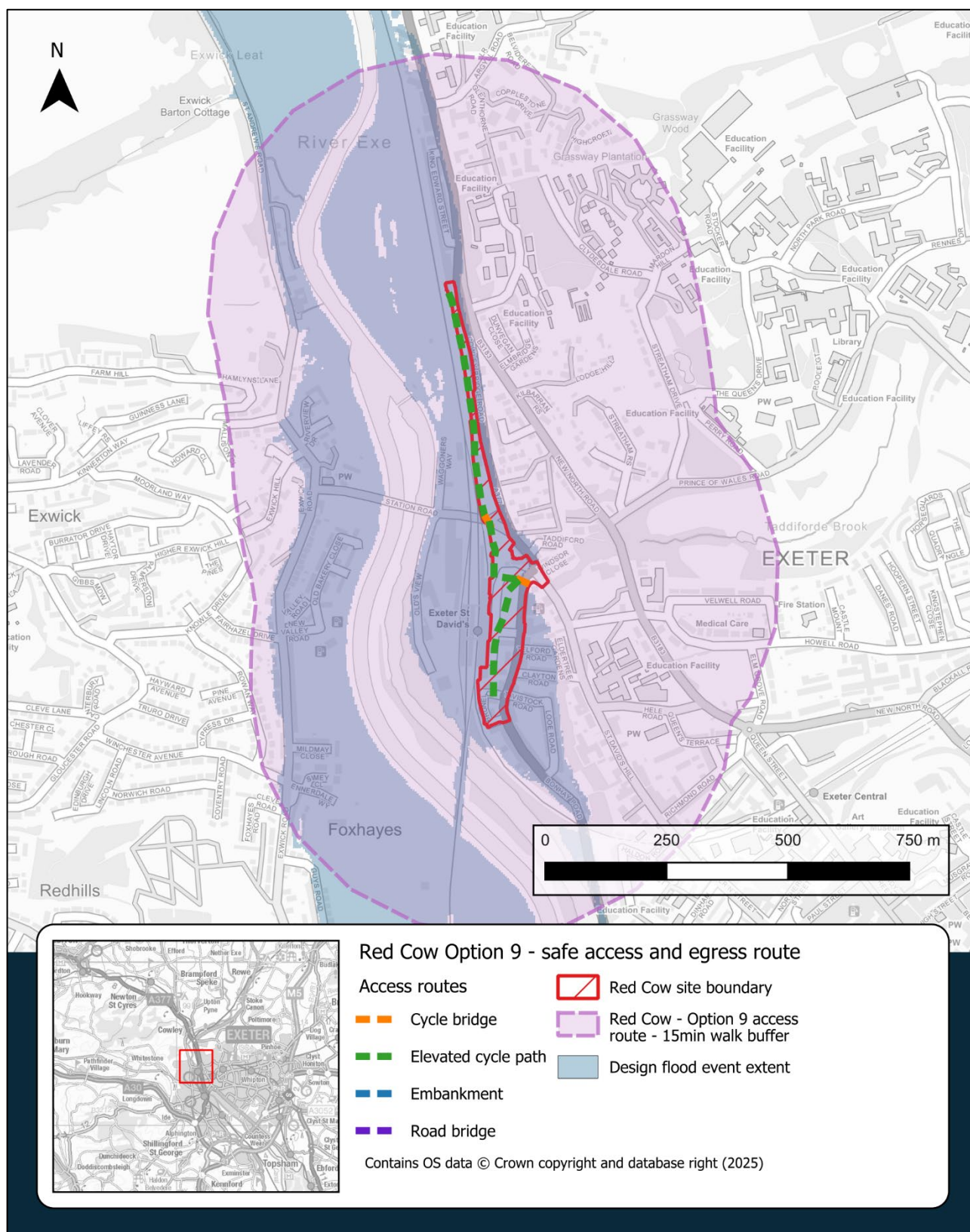


Figure 4-1 - Emergency Access and Egress Route

4.2 Route Description

Red Cow Option 9 provides a safe access and egress route to the east of the Red Cow development site linking from the north and south of the site to St David's Hill. Figure 4-2 shows the proposed route for Red Cow Option 9 along with the structure types and areas serviced by the proposed access

The elevated cycle path between the north of the site and Station Road (Figure 4-2- RC_9 1) extends for 452m in a southerly direction until it reaches Station Road. The elevation of the path will need to be approximately 15.0mAOD, at the north end, lowering to 14.1 at the south end, which is on average approximately 1.1m - 2.25m above the surrounding ground level here.

The elevated cycle path will connect to a cycle bridge over Station Road (Figure 4-2 - RC_9 2) which will be approximately 40m long with a minimum span of 16m across the road. The elevation of the bridge will need to provide sufficient clearance (5.03m) over the highway.

From the Station Road cycle bridge, an elevated cycle path continues to the south (Figure 4-2 - RC_9.3) which will extend for 97m to reach a bridge over Isambard Parade and the continuation elevated cycle path to the south of the site. The elevation of the path will need to be approximately 14.0mAOD which is on average approximately 1.5m above the surrounding ground level.

From the junction of the elevated cycle path RC_9.3 with the cycle bridge over Isambard Parade, another section of elevated cycle path continues for 233m to the south of the site (Figure 4-2 - RC_9.4). The elevation of the path would need to be approximately 13.9mAOD at the junction with the Isambard Bridge, lowering to 13.75 at the south end, which is on average approximately 1.6m - 1.9m above the surrounding ground level here.

From the junction of the elevated cycle paths RC_9.3 and RC_9.4, a cycle bridge extends east over Isambard Parade (Figure 4-2 - RC_9.5), dropping down to ground level next to the A377 Bonhay Road / St David's Hill junction. The elevation of the bridge will need to provide sufficient clearance (5.03m) over the highway.

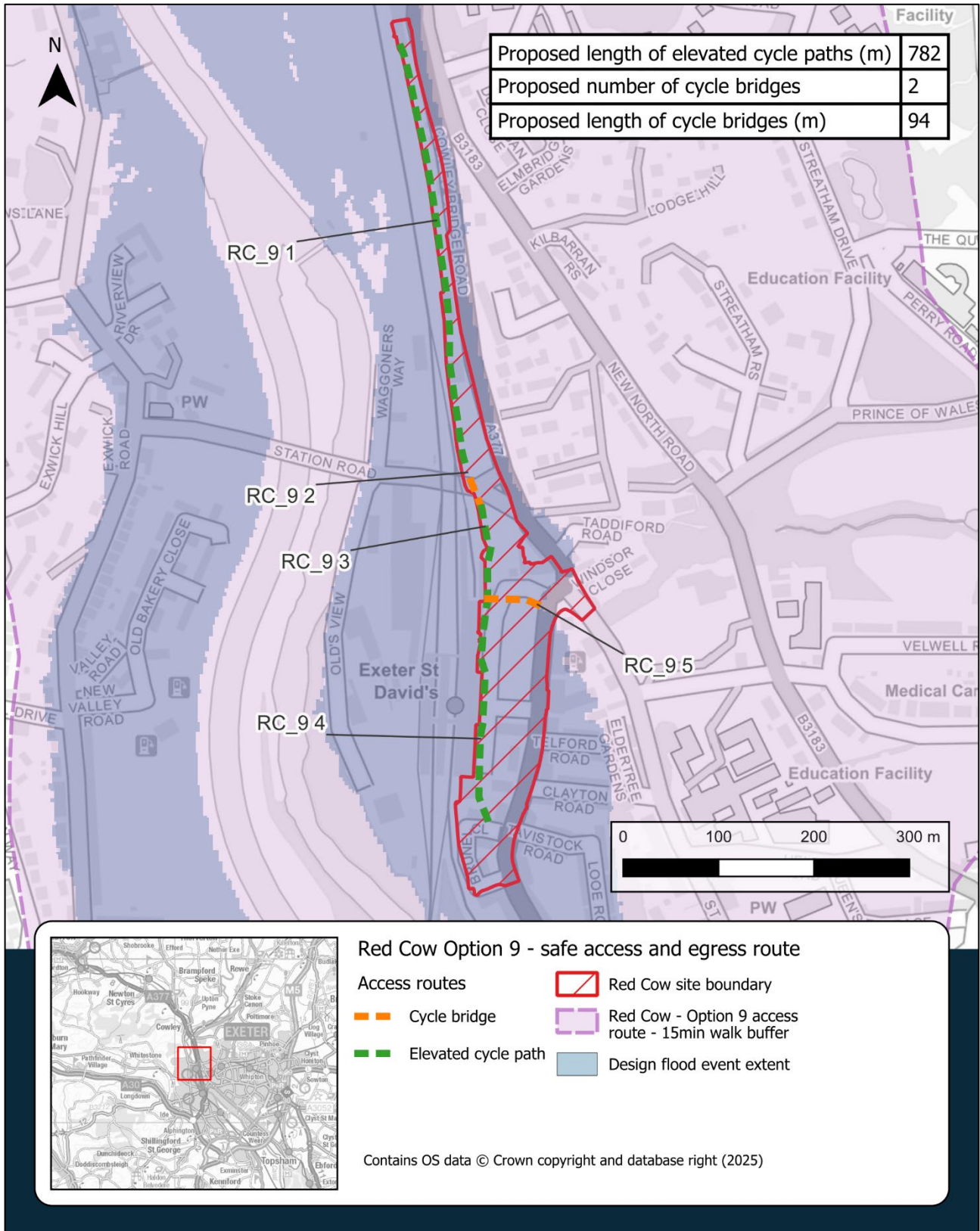


Figure 4-2 – Red Cow Option 9

4.3 Evacuation Destination

The evacuation destination is the safe zone east of the site at St. David's Hill. There is substantial onward connectivity from there, as described in Section 4.5. Near to the safe zone is Exeter College, Hele Road which could be used as an evacuation centre.

4.4 Rest Areas

The 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 as well. Consideration should be given during the design phase to other suitable functions e.g. a rest area with seating could be built in along the route, which could also serve as a viewpoint area with interpretation information.

4.5 Associated Emergency Infrastructure

The Red Cow Cycle Path route leads to a safe zone at St Davids Hill. This is located approximately 1km north west of the city centre with its associated infrastructure. Bus route H connects from St Davids Hill to the city centre and bus route D from New North Road (approximately 250m from the end of the Red Cow EAE route) to the city centre.

A railway station is located within Exeter city centre at Exeter Central. Other railway stations include those at Exeter St. Davids, Marsh Barton, St. Thomas and Digby and Sowton.

Devon and Cornwall Police Paris Street station is located within the city centre. Royal Devon and Exeter Hospital (Wonford), Barrack Road and Exeter Middlemoor Fire Station are both located on the east side of the city.

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

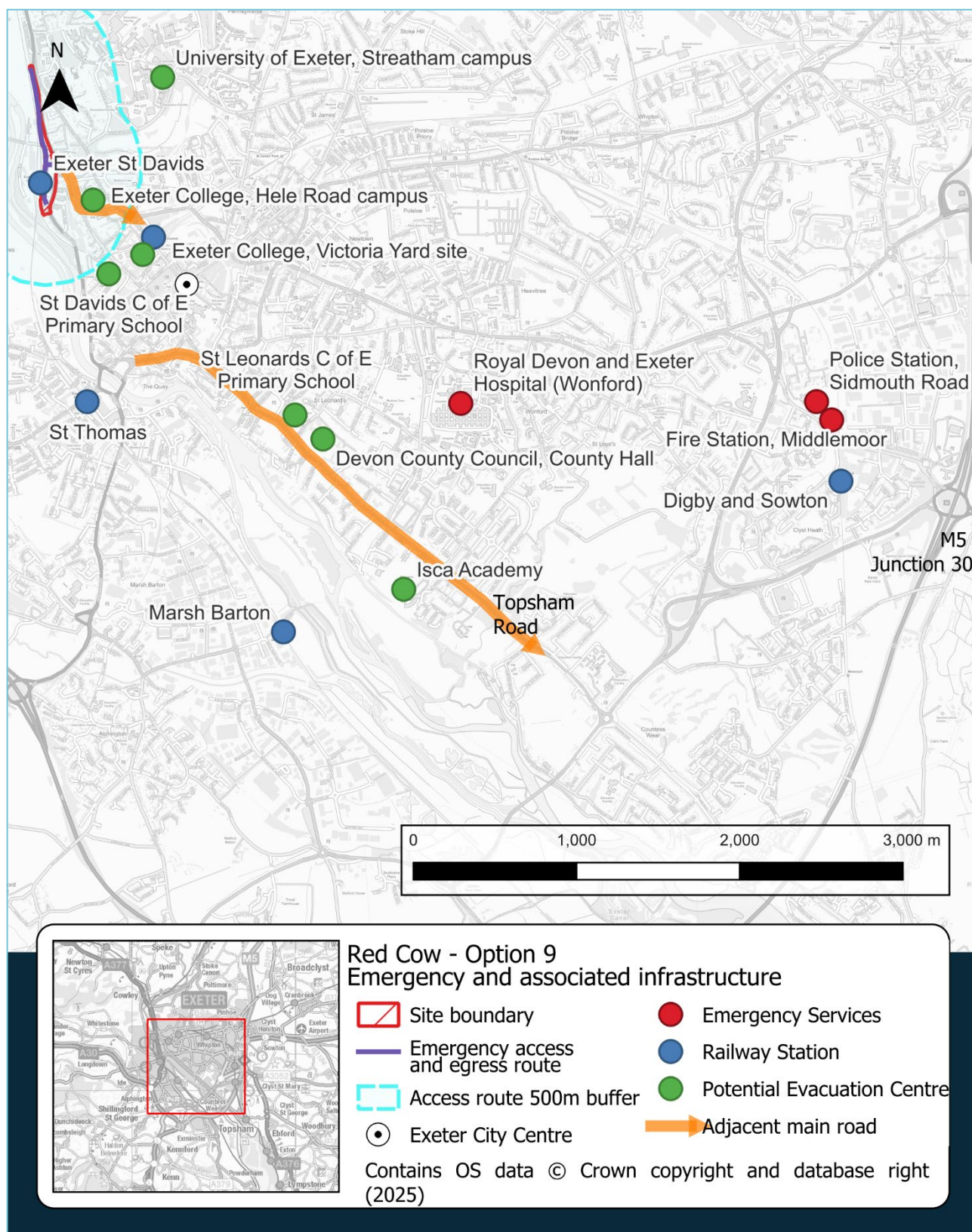


Figure 4-3 - Emergency Infrastructure in Proximity to Red Cow

5 Timeline

5.1 Overview

Phase One: 2024–2025 (Figure 5-1) marks the beginning of the project timeline extending through to 2039. During this initial phase, foundational planning, stakeholder engagement, and preliminary design work will take place. It is anticipated that a fully functional emergency access and egress route could be in place by 2039, most likely during the 2035–2039 period.

The site land is mostly within the development zone with the car park located in the south section being owned by National Rail. For development to take place, agreement must be made with National Rail to move the project further. Assuming a construction period of 4 to 6 years, works could begin around 2030. This allows adequate time for detailed design, consultation processes and essential fundraising.

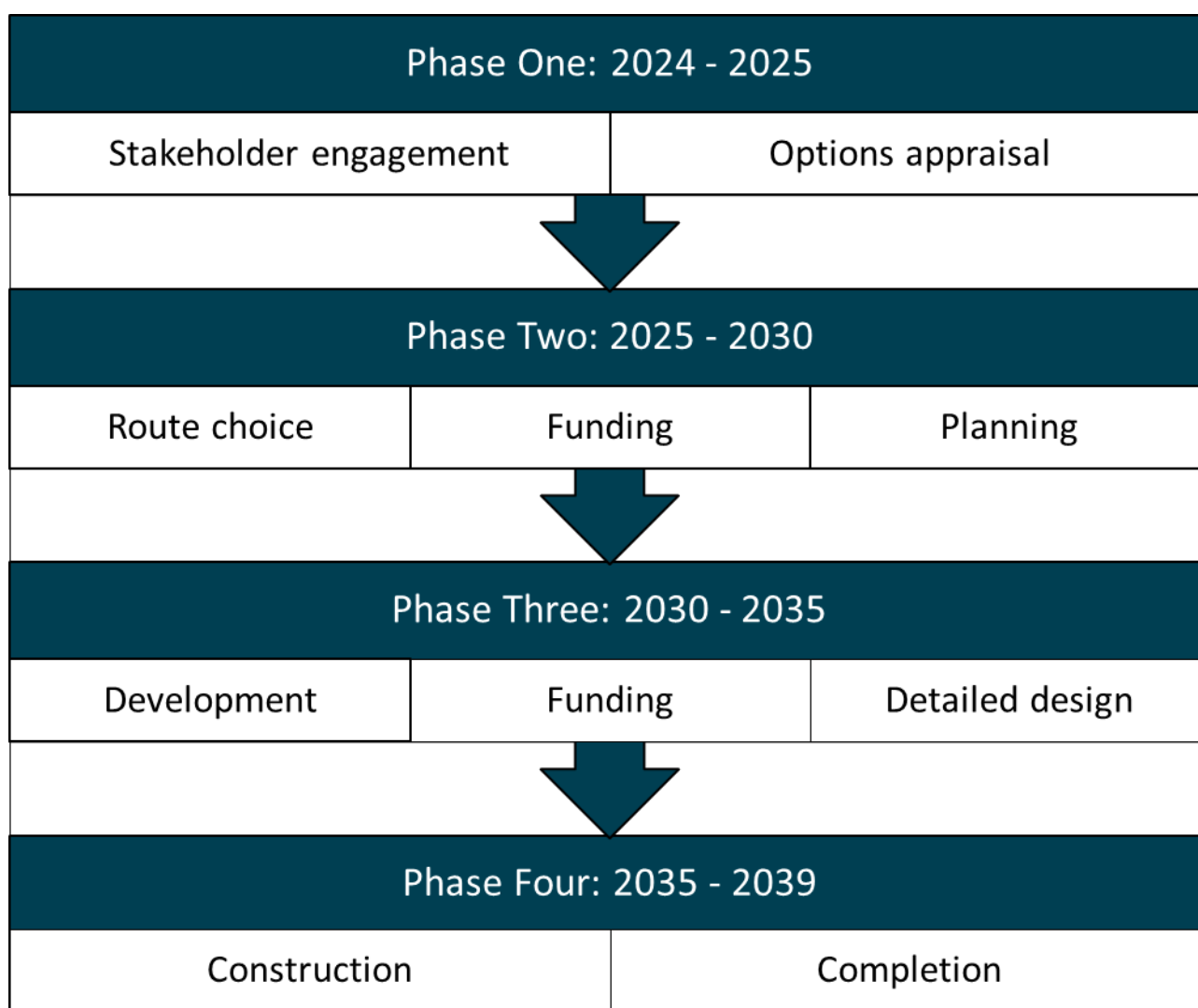


Figure 5-1 - Project Phases

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.

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. Strong project management will be required to ensure the route is delivered within the 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 Red Cow forms a vital part of Exeter City Council's strategy to safely and sustainably redevelop one of the city's most prominent brownfield sites. Predominantly located within Flood Zone 3 and subject to multiple sources of flood risk, Red Cow presents both a significant challenge and 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 Red Cow Elevated Cycle Path emerged as the preliminary preferred solution due to its strong performance against all evaluation criteria, offering an accessible, deliverable, and resilient route to a designated safe zone west of the River Exe.

This provisional route enhances pedestrian and cycle connectivity through the city, as well as integrating into a wider vision of Red Cow as welcome hub for Exeter. 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. However, other route options could be explored going forward.

Phase One (2024–2025) has marked initial phase where foundational planning, stakeholder engagement, and preliminary design work has taken place. Further engagement with stakeholders and developers is essential to further progress for this development site. With developmental agreement, it is anticipated that a fully functional emergency access and egress route could be in place by 2039, most likely during the 2035–2039 period.

As an enabler of the Exeter Plan and the Liveable Exeter vision, the Red Cow 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. The Taddiforde Brook is culverted underneath the site running east to west below Cowley Bridge Road and the railway to outfall into the River Exe 100m south of Station Road.

A.2 Fluvial Flood Risk

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

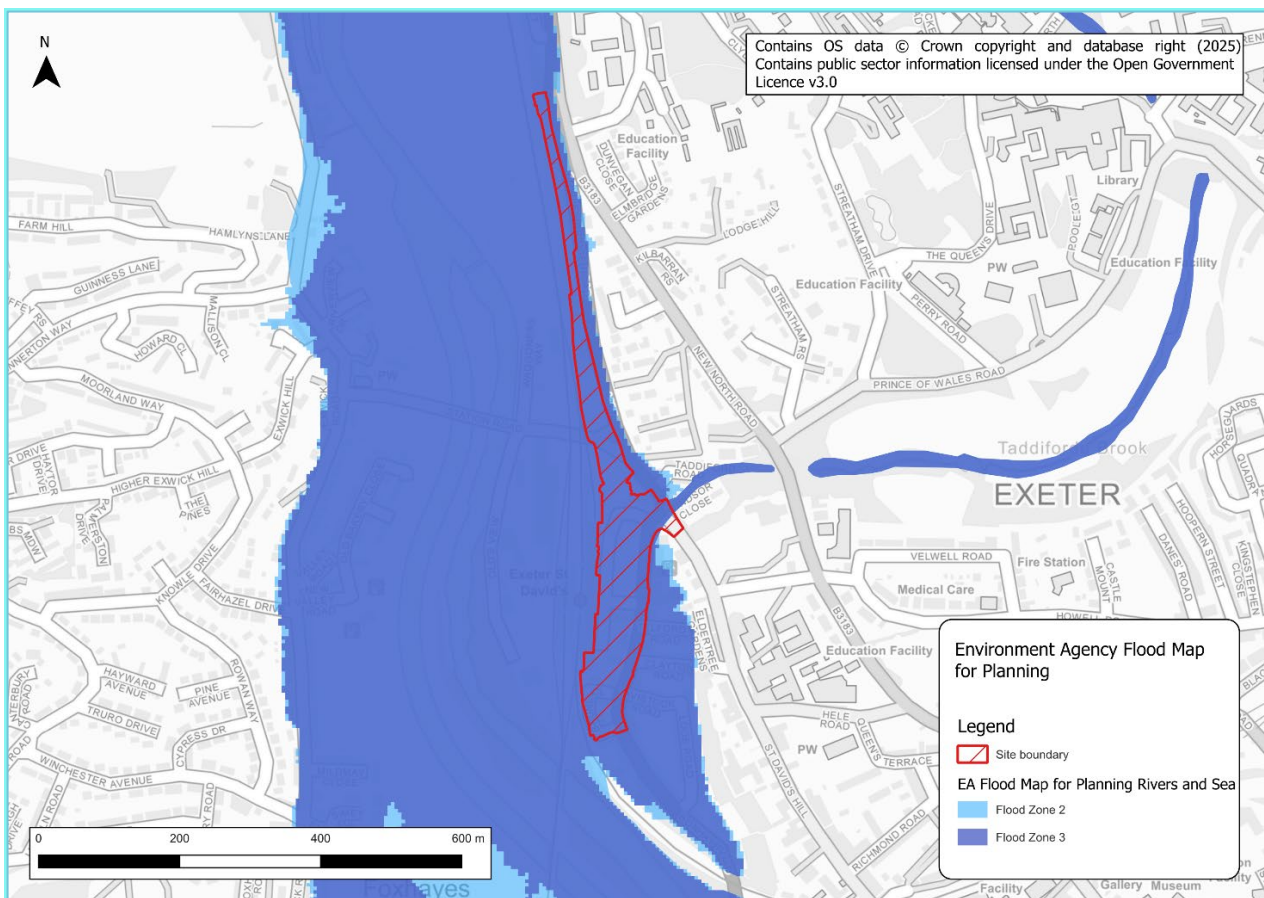


Figure A-1 - Environment Agency's Flood Map for Planning

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 (Figure A-2). This corresponds to the recommended fluvial climate change uplift for the Central allowance during the 2080's epoch in the East Devon Management Catchment¹.

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, 96% of the site is flooded. There is a risk of breach from the demountable railway defences at Cowley Bridge, which run across the railway track upstream of the site. The breach modelling of these defences indicates widespread flooding across the site, initially encroaching from the north. Along the bank of the River Exe and running alongside the railway track, there are additional defences, including a sheet piled wall, the Station Road flood gate, a combi wall, Old View Road embankment and St David's flood wall.

¹ <https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3033>

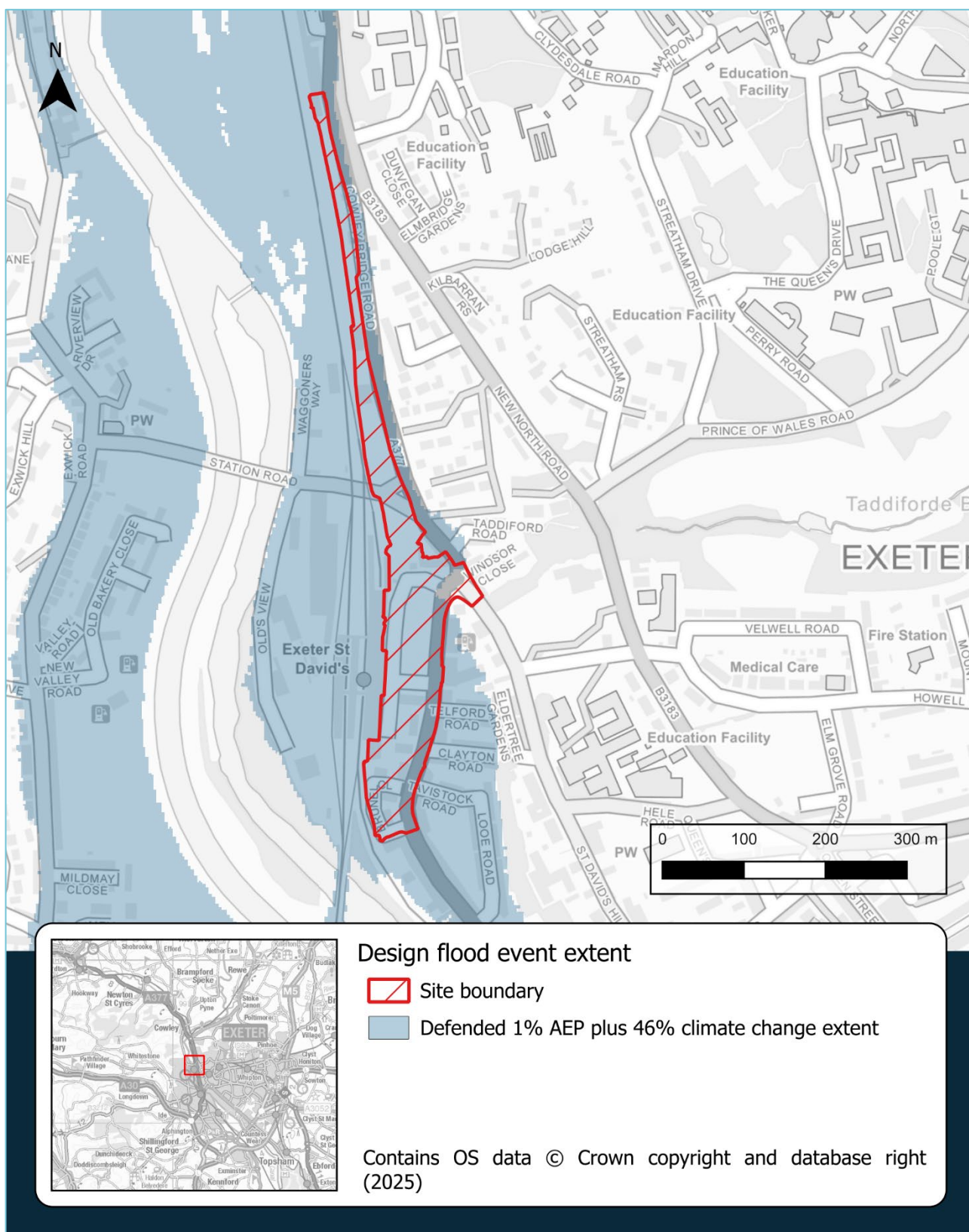


Figure A-2 - 1 in 100-year (1% AEP) + 46% Climate Change Flood Extent

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.

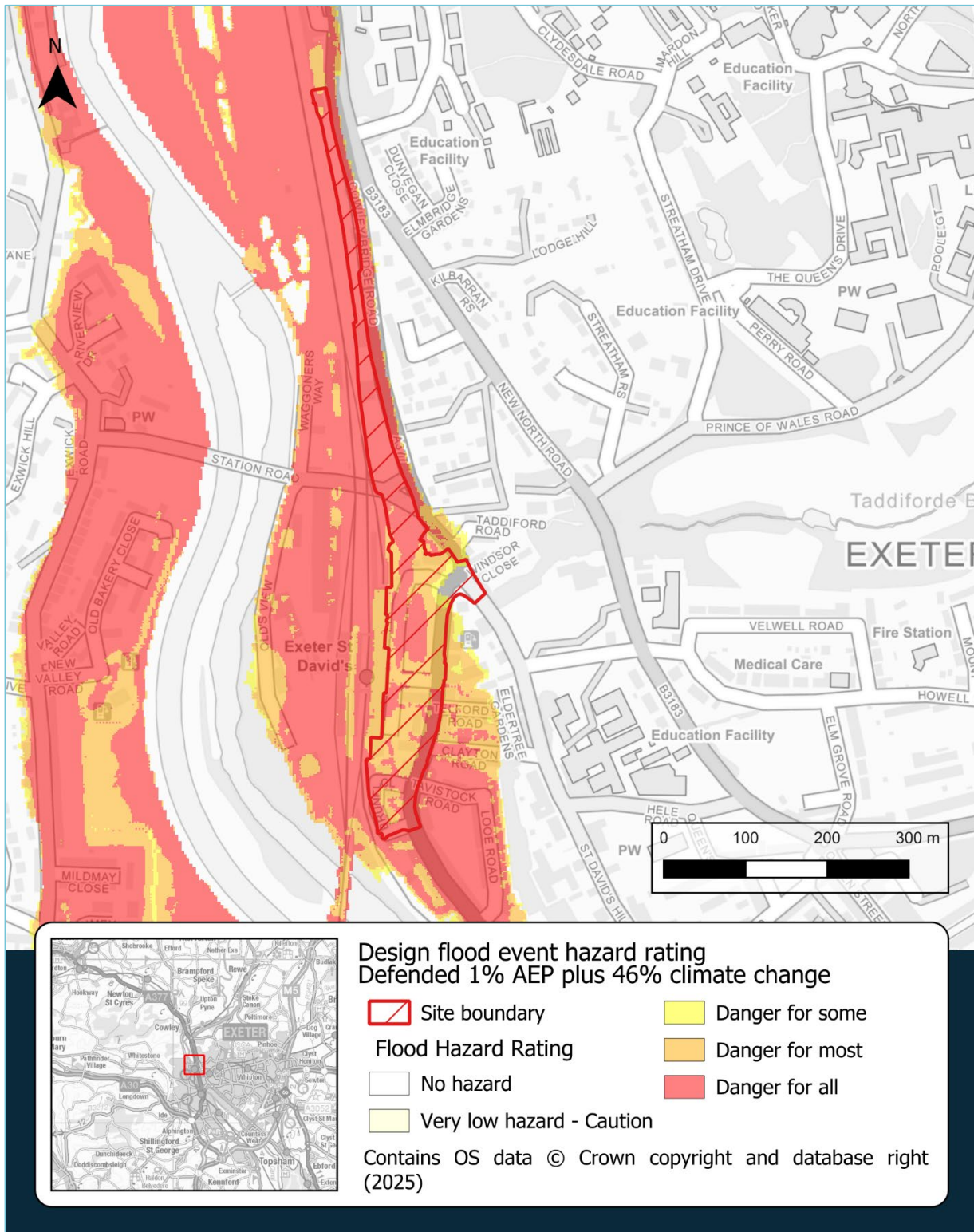


Figure A-3 - 1 in 100-year (1%AEP) + 46% Climate Change Hazard Map

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 13.5 hours before reaching its maximum depth of 3.54m, which remains for approximately 10 hours before beginning to recede (Figure A-4).

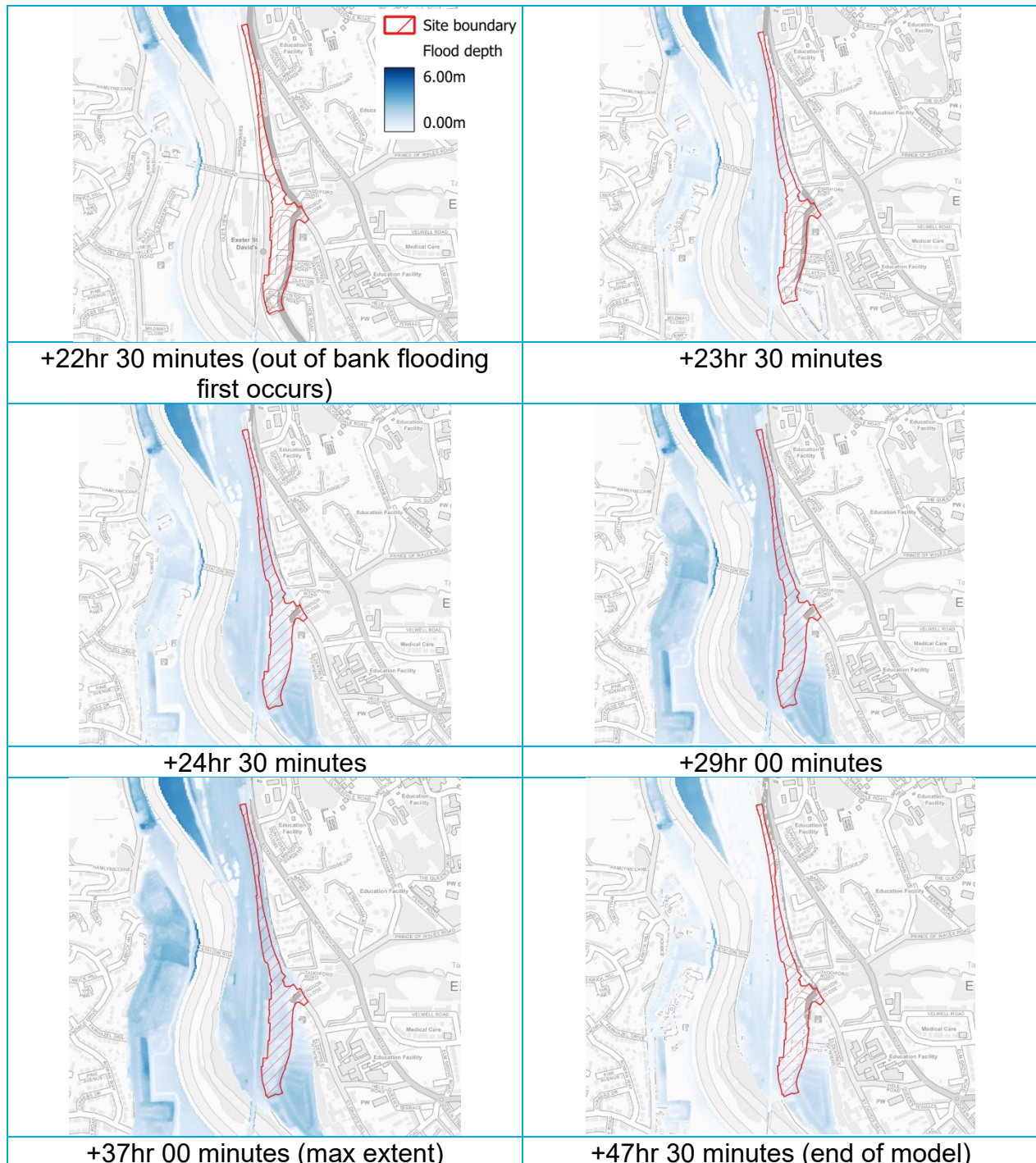


Figure A-4 - Modelled Flood Depth Durations at 1% AEP + 46% CC

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 A-5) and the JBA Level 2 Strategic Flood Risk Assessment (Figure A-6) have been consulted to assess flood risk from surface water. This site is shown to be at high risk of flooding from surface water event in the 1%AEP and the 0.1%AEP events, with ponding mean depths of 1.12m. The surface water risk is exacerbated by risk from flooding from the Taddiforde Brook, which is culverted underneath the site. Flooding from the Taddiforde Brook was modelled for the defended 1% AEP event with a 46% climate change uplift where flooding was shown to impact the central region of the site, flowing west across Red Cow Road to enter the site from the east. The flooding mainly impacts St. David's overflow car park, where the depths reach a maximum of 0.63m.

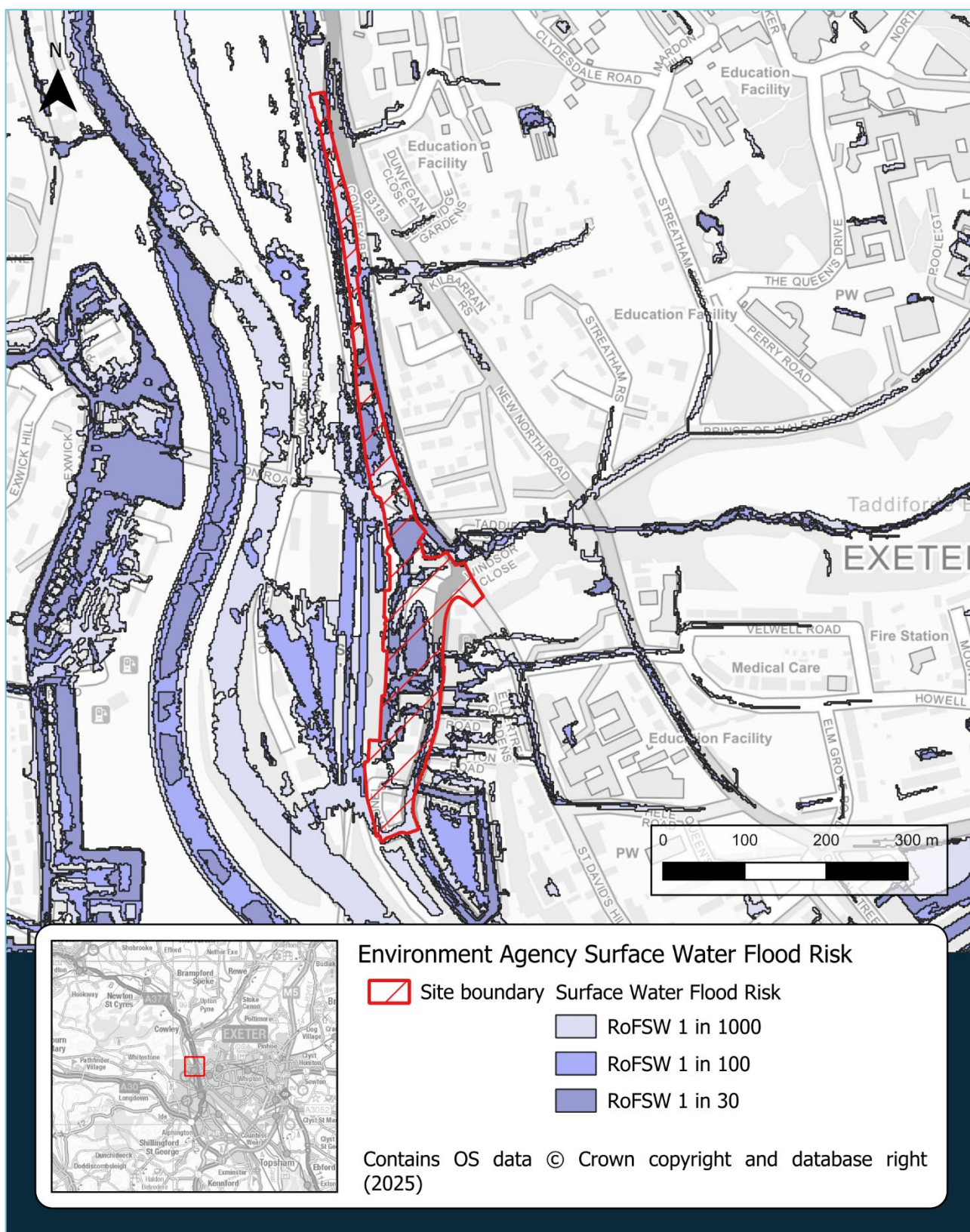


Figure A-5 - Environment Agency's Risk of Flooding from Surface Water Map

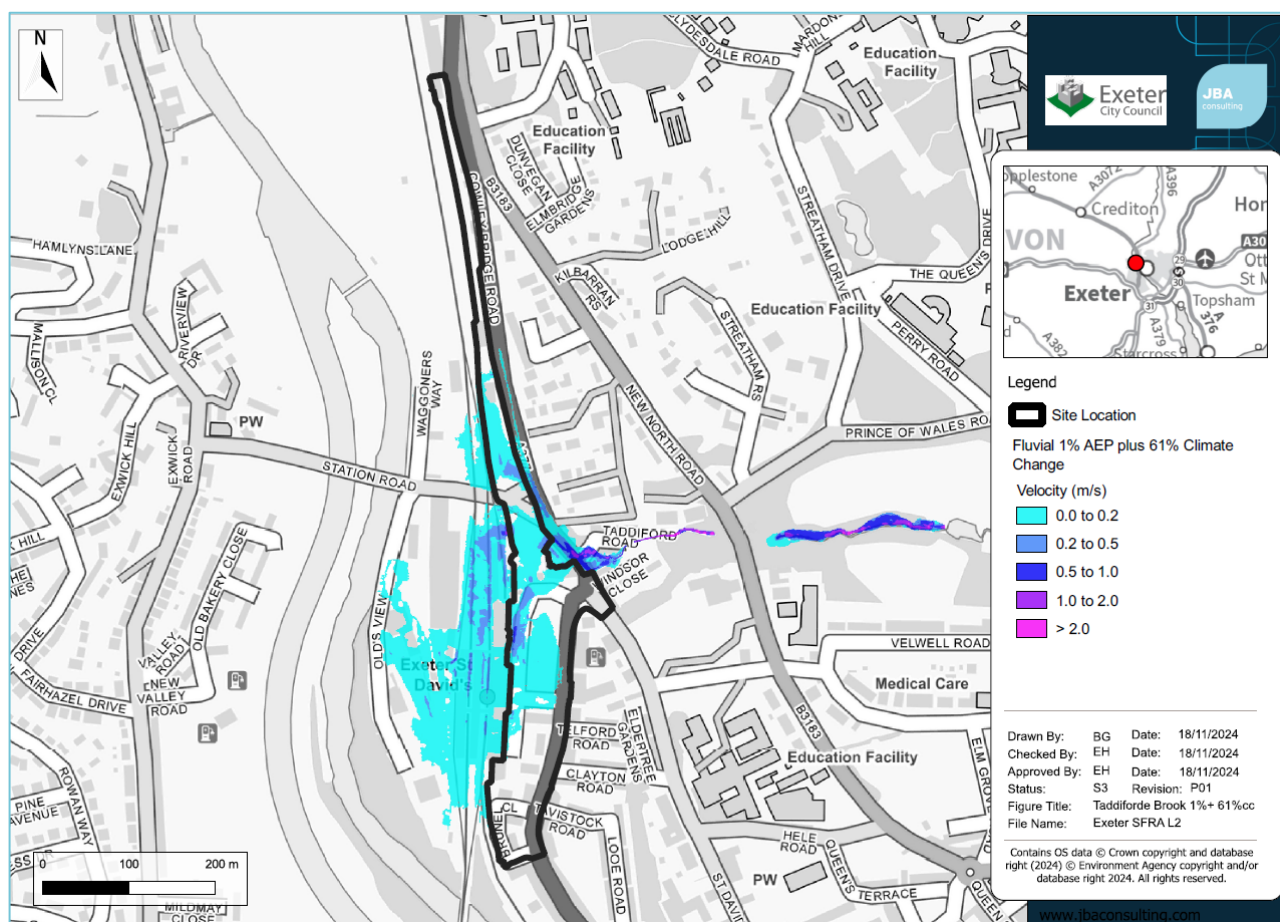


Figure A-6 – JBA L2 SFRA 1% AEP + 46% CC Surface Water Flooding Risk Map

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 in 100 year AEP model outputs which are outlined in Table A-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 in 100 year 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 the majority of the Red Cow site is at low risk of groundwater flooding. However, this should be confirmed through infiltration testing and groundwater monitoring.

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 1 in 1000 year AEP 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, the Red Cow 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 and in the route plan itself. 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 also 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 B-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 provide 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 clearer readability

			Option 1 Do Nothing	Option 2 Flood warning	Option 3 Temporary structures	Option 4 Clayton Road elevated cycle path	Option 5 Prep Lane elevated cycle path	Option 6 Red Cow South elevated cycle path	Option 7 Railway overpass cycle path	Option 8 Owley Bridge Road embankment	Option 9 Red Cow elevated cycle path	Option 10 Bridge over New North Road	Option 11 Bridge to St. Andrew's Road	Option 12 Combination of Options 5 and 10	Option 13 Combination of Options 5 and 10	Option 14 Combination of Options 5 and 10	Option 15 Combination of Options 7 and 10		
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	New elevated cycle path along Clayton Road connecting up to Bderree Gardens	New elevated cycle path behind Point Be and across Bonhay Road to Prep Lane	Elevated cycle path between Brunel Cose and Station roundabouts	Raised structure over railwayline connecting B. Davids to Haldon Road via Brunel branch line	Raise Owley Bridge Road between Brixs Garage and Station roundabouts	Elevated cycle path between N and S of site and Station roundabouts	Bridge over Owley Bridge Road, connecting into New North Road	Bridge over railwayline, River Be (main channels and flood relief channel), across park land and connecting into St. Andrew's Road	4. New elevated cycle path along Clayton Road connecting up to Bderree Gardens	5. New elevated cycle path behind Point Be and across Bonhay Road to Prep Lane	6. New elevated cycle path between Brunel Cose and Station roundabouts	7. New elevated cycle path behind Point Be and across Bonhay Road to Prep Lane	
Pass/Fail Criteria	Connectivity to Safe Zones (feedback loop if fail - can't 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. Fail: Connectivity to areas at flood risk or areas not at flood risk that do not provide access to welfare facilities and resources.	Pass/Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
	Capacity	Assessment of the capacity to easily disperse/egress 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	Fail Narrow and steep with bend(s) so limited capacity to reach Bderree Gardens' elevation	Fail Steep and narrow access up slope (steps) from site to safe zone. Safe zone itself would be suitable	Pass Good capacity	Pass However, safe zone is narrow residential streets	Pass Good capacity	Pass Limited pavement capacity on egress zone on New North Road, although this likely to be closed to through traffic if execution is needed	Pass Egress point leads to residential roads with distant, indirect access to wider streets	Pass Relatively remote so may require extra resources to manage during operation. FRS/avoided concerns over remote bridges during normal operation	Fail 4. Fail - Narrow and steep with bend(s) so limited capacity to reach Bderree Gardens' elevation. 10. Pass - Limited pavement capacity on egress zone on New North Road, although this likely to be closed to through traffic if execution is needed	Fail 5. Fail - Steep and narrow access up slope (steps) from site to safe zone. Safe zone itself would be suitable. 10. Pass - Limited pavement capacity on egress zone on New North Road, although this likely to be closed to through traffic if execution is needed	Pass 6. Pass - Good capacity	Pass 10. Pass - Limited pavement capacity on egress zone on New North Road, although this likely to be closed to through traffic if execution is needed	Pass 5. Long sections of cycle lane with. Connects to less accessible safe zone location. 11. Steep, narrow residential road and 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 restricted 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 3FR 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. Divided concerns that high quantity urban debris will snag on the supports, blocking flow paths	Pass	Pass Largely parallel to flow, elevated allows flow, supports may well catch urban debris so will need to be well spaced. Access ramps may create barriers	Pass Largely parallel to flow, elevated allows flow, supports may well catch urban debris so will need to be well spaced. Access ramps may create barriers	Pass Largely parallel to flow, elevated allows flow, supports may well catch urban debris so will need to be well spaced. Access ramps may create barriers	Pass Good capacity	Pass Limited pavement capacity on egress zone on New North Road, although this likely to be closed to through traffic if execution is needed	Pass However, multiple supports needed for wide span raised structure, perpendicular to flow	Pass Relatively remote so may require extra resources to manage during operation. FRS/avoided concerns over remote bridges during normal operation	Pass Max distance = 300m in middle of the 2 schemes	Pass Max distance = 300m in middle of the 2 schemes	Pass Max distance = 300m in middle of the 2 schemes	Pass Max distance = 300m in middle of the 2 schemes	
	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. Seen to deal with those who did not follow instructions	Fail Significant resourcing needed for installation and stewarding	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
Pass/Fail overall score	Deliverable independently? (feedback loop if fail - can't be passed with combi-option)	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/Fail	Pass	Pass Being via Owley Bridge Rd in the N, or via Bonhay Rd in S	Pass 60m	Fail 600m from N end of site to normal access via St Davids Hill road (not using Option 4). In S of site max distance of 125m to other Option 4 or St Davids Hill	Fail 600m from N end of site, so will rely on other options to serve the N	Fail 675m from N end of site to N end of scheme or to existing St Davids Hill safe zone	Pass 325m from edge of site to existing St Davids Hill safe zone	Pass 55m with extension of scheme to S of site	Fail 770m to St Andrew's. Poor connectivity to S of site, so will rely on other options to serve the S	Fail 400m to St Davids Hill. 720m to S boundary of site. Poor connectivity to S of site, so will rely on other options to serve the S	Pass Max distance = 300m in middle of the 2 schemes	Pass Max distance = 300m in middle of the 2 schemes	Pass Max distance = 300m in middle of the 2 schemes	Pass Max distance = 300m 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	Pass/Fail	N/A	N/A	N/A	Yes (with option 10), see option 12	Yes (with option 10), see option 13	Yes (with option 10), see option 14	Yes (with option 10), see option 15	N/A	No	See options 12, 13, 14, 15	No	Combination option	Combination option	Combination option	Combination option	
	Land ownership		Pass/Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	
	Deliverability criteria	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 negotiation, prohibitive costs). Current land use considered.	Pass/Fail	N/A	N/A	N/A	ECQ? and limited number of third party	National Rail plus private and/or other landowners involved. Some ECQ land	Mostly National Rail plus private and/or other landowners involved. Some ECQ land	Mostly National Rail plus private and/or other landowners involved. Some ECQ land	ECQ	All within development zone, National Rail (and car park) within the S section of development site	Small footprint. 1 private landowner, plus ECQ/DOCC owned land	ECQ, Brunel and DOCC owned land	4. ECQ? and limited number of third party 10. Small footprint. 1 private landowner, plus ECQ/DOCC owned land	5. National Rail plus private and/or other landowners involved. Some ECQ land, 10. Small footprint. 1 private landowner, plus ECQ/DOCC owned land	Mostly National Rail plus private and/or other landowners involved. Some ECQ/DOCC land	7. Mostly National Rail plus private and/or other landowners involved. Some ECQ/DOCC land	
Pass/Fail overall score	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	N/A	880m from N end of site to safe zone (975m in total)	115m	325m	290m	665m	630m within site (765m on DOCC but extends N of site boundary)	Longest = 665m (N section), 245m (S section)	30m	450m	Maximum = 115m (Option 4)	Maximum = 325m (Option 5)	Maximum = 665m (Option 7)	
	Accessibility	Assessment of ease of access to the option from areas within the site (i.e. if obstacles to direct access are present) and the ease of access to a safe zone (i.e. consideration of steep slopes or steps at the end of the route).	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A?	N/A	Width, access gradients and frequency/visibility of access points, stability could all be issues	Steep (and narrow) access up slope (steps) from site to safe zone, only connects to for S of site	Central to the Section of the site, access will require ramps to elevated scheme. Safe zone is easily accessible	Very good access from N section of site, does not serve Section but this has max 325m to safe zone. Raised road will have easy access	Easy access from within the site. Raised roadway will require access ramps. Good access to safe zone	Well to the north within the site (500m to S end of Owley Bridge Rd). Needs improved connectivity within the northern section and likely another option serving the Section. Will require significant height gain, potentially reducing accessibility	Moderately long plus all elevated cycle way or bridge. Poor accessibility in remote egress zone	Option 4: 2 Option 10: 3	Option 4: 2 Option 10: 3	Option 4: 2 Option 10: 3	Option 4: 2 Option 10: 3	Option 4: 2 Option 10: 3	
	Community Acceptance	Perceived impact on residents and local businesses in regard to construction and design (overlooking, overbearing and overshadowing)	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	Localised but significant intrusion of raised cycleway in front of houses & loss of parking spaces on Clayton Rd. Tree clearance	The clearance and visual intrusion on Bonhay Rd, especially for residents either side of Prep Lane	The only residential impact is on a few properties in Brunel Cose, majority of length in car park / station. Potential impact on capacity of existing footway at end of Clayton Rd (intrusion)	Largely hidden, similar to railway. Localised impact on Haldon Rd (land purchase & intrusion at end of scheme) and on Bonhay Rd (intrusion)	Very limited negative impact along N section of road. From junction with Station Rd to roundabout, residential properties along road will be adversely affected by raised road (initial estimate of 1.5m)	N section is currently brownfield, awaiting redevelopment. Section is car park - little aesthetic appeal but requirement to retain function and capacity as station car park	Will improve accessibility from east to open access land on west of river. Indirect negative impact on residents at end of Clayton Rd (intrusion)	Option 4 concerns: Localised but significant intrusion of raised cycleway in front of houses & loss of parking spaces on Clayton Rd. Tree clearance	5. Tree clearance and visual intrusion on Bonhay Rd, especially for residents either side of Prep Lane	4. The only residential impact is on a few properties in Brunel Cose, majority of length is car park / station. Potential impact on capacity of existing footway at end of Clayton Rd (intrusion)	7. Largely hidden, similar to railway. Localised impact on Haldon Rd (land purchase & intrusion at end of scheme) and on Bonhay Rd (intrusion)		
	Environmental Impact	Perceived impact on biodiversity, habitat availability and quality	1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	Indirect impact of construction materials for (relatively short) elevated section and ramped connection to Bderree Gdns	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	Indirect impact of construction materials, tree felling along Bonhay Rd likely	
Pass/Fail overall score	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	Intrusion of raised cycleway in front of houses on Clayton Rd. Tree clearance	Localised, but raised path would obstruct limited number of residents' outlook. Limited impact of main length from Point Be and along Bonhay Rd	Land with currently low aesthetic value	Very limited impact	Very limited impact	Very limited impact	Very limited impact	Very limited impact	Very limited impact	Very limited impact	Very limited impact	Very limited impact	
	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	Already similar green travel options in this area (St Clements Lane), this is unlikely to offer a better alternative	Would slightly improve access along Bonhay Rd from Brunel Cose & Davids but this depends on ease of access to raised route. Access to city centre via Prep Lane steps unlikely to see increased use due to width and gradient	Order bridge will improve access from St Davids Hill to station but no significant new routes	Could improve access from city centre to St Davids Station to a limited extent, but cycling limited by one-way roads / ease of access to Haldon Rd	Will provide an important link from the N end of the site to St Davids Hill and station, avoiding Owley Bridge Rd. Does not connect onwards to the N	Will not significantly alter existing access (consider combining with Option 8)	Will not significantly alter existing provision	Will not significantly alter existing access	Will not significantly alter existing provision	Will not significantly alter existing access	Will not significantly alter existing provision	Will not significantly alter existing access	
	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	Medium scale construction compared to others	Medium scale construction compared to others	Large scale construction compared to others	Large scale construction compared to others	Medium / large length elevated construction	Small scale bridge construction compared to other options	Construction materials for 2 large span bridges and length elevated cycle path. Construction within open green space	Construction materials for 2 large span bridges and length elevated cycle path. Construction within open green space	Construction materials for 2 large span bridges and length elevated cycle path. Construction within open green space	Construction materials for 2 large span bridges and length elevated cycle path. Construction within open green space	Construction materials for 2 large span bridges and length elevated cycle path. Construction within open green space	Construction materials for 2 large span bridges and length elevated cycle path. Construction within open green space	
	Cost		1 (Bad), 2, 3, 4, 5 (Good)	N/A	N/A	N/A	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	Land purchasing, elevated cycle way and bridges. Mid length scheme	
Multiplier (make pass fail and then merge together into new option)			N/A	N/A	N/A	26	24	33	22	32	38	37	28	24	23	32	22	22	
Rank			Fail	Fail	Fail	Fail	Fail	Fail	Fail	2	1	Fail	Fail	Fail	Fail	3	4	4	
Risks/opportunities for delivery						Fail due to poor accessibility and poor capacity due to steep gradients and access to egress areas. Objections from Clayton Rd residents	Land purchasing, localised objections and purchasing, localised objections	Land purchasing, localised objections and purchasing, localised objections	Significant construction challenges and cost. Difficult access / land purchase at safe zone and of scheme. Relatively limited potential for useful green infrastructure connection	Limited objections, good access to north of site. Does not provide any Green Infrastructure benefits.	Good access to whole site, few environmental, aesthetic, community objections. Could combine with option 10 to improve dry access to N of site.	Limited objections, easy land ownership, small scale construction, reasonable access to north of site. Does not provide any Green Infrastructure benefits. Limited access to South	Fail due to Option 4 issues. Poor capacity due to steep gradients and access to egress areas. Objections from Clayton Rd residents	Fail on Option 5 capacity - steep access up slope (steps) from site to safe zone	Fail on Option 5 capacity - steep access up slope (steps) from site to safe zone	Fail on Option 5 capacity - steep access up slope (steps) from site to safe zone	Fail on Option 5 capacity - steep access up slope (steps) from site to safe zone	Fail on Option 5 capacity - steep access up slope (steps) from site to safe zone	
			No	No	No	Poor connectivity to N of site, so will rely on option 10 to serve the N	Poor connectivity to N of site, so will rely on option 10 to serve the N	Poor connectivity to N of site, so will rely on option 10 to serve the N	Poor connectivity to N of site, so will rely on option 10 to serve the N	No	No	Poor connectivity to S of site, so will rely on other options to serve the S	Poor connectivity to S of site, so will rely on other options to serve the S	Combination option	Combination option	Combination option	Combination option	Combination option	
Reliance on other options			Separate or give weighting/multiplier (e.g. whole score multiplied by 0.6 if needs to be delivered alongside another)																

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