The Sizewell C Project

5.6 Sizewell Link Road Flood Risk Assessment

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Contents

Tables

Plates

Figures

Appendices

Executive Summary

The proposed development is one of the Sizewell C Project's associated development sites; the proposed Sizewell link road (referred to as the 'proposed development') would comprise a new permanent 6.8 kilometre (km) single carriageway road that would connect the A12 south of Yoxford, and bypass Middleton Moor and Theberton before joining the B1122.

This **Sizewell Link Road Flood Risk Assessment (FRA)** (Doc Ref. 5.6) presents an assessment of existing flood risk from all sources of flooding to the proposed Sizewell link road to support the development of the proposed Sizewell C Project. The FRA also describes future flood risk to the site taking account of climate change and considers possible changes in flood risk to off-site receptors as a result of the proposed development. It also presents mechanisms for managing residual risk.

The proposed development includes seven watercourse crossings, which to aid the discussion of the watercourses within this FRA, have been numbered sequentially from west to east starting at SW1 and finishing at SW7.

The Sizewell link road is shown to be at low tidal, fluvial, groundwater, sewers and reservoir flood risk. Flood risk from surface water is variable across the site. The majority of the site is at 'very low' risk of flooding from surface water. However, areas associated with watercourses are at 'high' risk of flooding from this source. Due to this identified risk, hydraulic modelling was undertaken for five of the seven watercourse locations that would be crossed by the proposed development, provided in **Appendix A** of this document.

Of the two crossings that haven't been modelled, one of them, SW4, is not on the proposed route of the Sizewell link road itself, but within an access to it. It has an existing culvert which will not be altered, and the road levels will remain similar to existing, so no impact from the development is foreseen. For the other crossing, SW7, it has not been possible to obtain enough detailed survey of the existing culvert and other local details to enable reliable modelling. A pipe of the same area dimensions as currently in place would retain all existing flow through the crossing ensuring downstream flows are unchanged. It is also proposed to provide overflow culvert and watercourse relief basin to address the upstream impact of the crossing. A substantial area has been allowed for the basin and the details will be confirmed as part of detailed design following further survey and modelling.

The five watercourse crossings that were modelled included embedded designs using portal culverts which do not encroach on the channel, thereby avoiding in-channel flood risk and morphological impacts.

For crossings SW1 and SW3 further flood relief culverts were embedded into the design to minimise the constraint on water flowing over adjacent low-level floodplains

and maintain the overland flow. The modelling results for crossings SW2, SW5 and SW6 showed negligible local peak level changes for the design off-site flow (1 in 100-year with 35% climate change), all less than 10mm and within channel.

Crossing SW1 showed an increased peak level of approximately 130mm with the proposed crossing compared to the baseline at the design flow. The impact is very limited with no property flooded. The additional extent, where this is not in channel, is only about 1 metre (m) additional width and within agricultural land and grassland.

Crossing SW3 showed a general slight reduction in design off-site peak levels as a result of the proposed Hawthorne road and Sizewell link road crossings, apart from a very short section where the model showed a 20mm increase. This increase does not affect any property and is limited to about 1m additional width compared to the baseline.

The Sizewell link road has been designed using sustainable drainage systems (SuDS) principles to collect run-off into infiltration basins and swales which would then infiltrate to ground, ensuring additional runoff does not worsen flood risk elsewhere.

Based on the above off-site modelling results, it is considered that due to the embedded designs, the Sizewell link road crossings have negligible impact on off-site receptors.

A review of the Sizewell link road design indicates that the finished road surface levels for each of the crossings are at least 2m higher than the corresponding modelled peak levels for the on-site design flows (1 in 100-year with 65% climate change). Therefore, the proposed Sizewell link road would be safe from flood risk for users for the design event including allowance for climate change for the lifetime of the development.

The route of the proposed Sizewell link road is classed as being ‘essential infrastructure’ under the National Planning Policy Framework (NPPF) and is located in Flood Zone 1. As per the Flood Risk Vulnerability and Flood Zone Compatibility table, the Sizewell link road is considered appropriate in terms of flood risk vulnerability. In addition, the flood risk from the identified watercourses has been shown to be low and therefore the proposed Sizewell link road passes the sequential test.

The FRA shows that the development will deliver local and strategic sustainability improvements and has negligible impact on off-site flood risk. It is therefore considered to have passed the exception test.

The proposed development is considered to be appropriate in terms of flood risk, the proposed mitigation measures and in accordance with NPPF guidance. It has been shown to be safe in terms of access and egress considerations.

1 Introduction

1.1 Background

1.1.1. This **Sizewell Link Road FRA** (Doc Ref. 5.6) describes the flood risk, from all sources, to the proposed Sizewell link road (referred to herein as the 'proposed development') and the predicted impact of the proposed development on flood risk in general. This FRA is submitted as part of the application for development consent for 'Sizewell C Project'[1].

1.1.2. The proposed development is one of the Sizewell C Project's associated development sites; a permanent single carriageway road that would run 6.8 km from the A12 just south of Yoxford in an easterly direction, joining the B1122 south of the town of Theberton.

1.1.3. This FRA also describes how the risk of flooding would be managed and provides recommendations to minimise any residual impacts associated with the proposed development.

1.1.4. The Sizewell link road would create a new route around the south of the villages of Yoxford, Middleton Moor and Theberton, helping to reduce the amount of traffic on the B1122 during the peak construction phase of the Sizewell C Project.

1.1.5. The Sizewell link road would be used by SZC Co. during the construction phase of the Sizewell C main development site, to transport construction workers and goods vehicles delivering freight to the Sizewell C main development site. It would also be open to the public.

1.1.6. Once operational, the Sizewell link road is proposed to be a permanent bypass of the existing B1122.

2 Legislation, policy and guidance

2.1 Introduction

2.1.1. This section identifies and describes the legislation, policy and guidance of relevance to the FRA for the proposed development.

2.1.2. Legislation and policy have been considered at a national and local level. The following are relevant as they have influenced the scope and/or methodology adopted for the FRA:

[1] SZC Co. proposal to build and operate a new nuclear power station, comprising two UK European Pressurised Reactors™ (EPRs), at Sizewell in Suffolk, north of the existing Sizewell B power station.

- Overarching National Policy Statement (NPS) (EN-1) (Ref. 1.1).
- ONR/EA Joint Advice Note: Principles for Flood and Coastal Erosion Risk Management (Ref.1.2).
- NPPF (Ref. 1.3).
- National Planning Policy Guidance (Ref. 1.4).
- FRAs: Climate Change Allowances (Environment Agency) (Ref. 1.5).
- Flood and Water Management Act 2010 (Ref. 1.6).
- Suffolk Coastal Local Plan (Ref. 1.7).
- Suffolk Flood Risk Management Strategy (Ref. 1.8).

2.2 Legislation

a) Flood and Water Management Act 2010

2.2.1. The Flood and Water Management Act was enacted in 2010. It aims to improve both flood risk management and the way we manage our water resources by creating clearer roles and responsibilities. This includes a lead role for upper tier and unitary local authorities in managing local flood risk (from surface water, ground water and ordinary watercourses) and a strategic overview role of all flood risk for the Environment Agency. The Flood and Water Management Act provides opportunities for a more comprehensive, risk-based approach on land use planning and flood risk management by Local Authorities and other key partners.

2.3 National policies and guidance

a) Overarching National Policy Statement for Energy EN-1

2.3.1. The Overarching NPS for Energy (EN-1) (Ref. 1.1) was prepared in 2011 and provides specific guidance on the development of energy infrastructure in relation to flood risk for the lifetime of the facilities. The national flood risk policies reflected in this document have since been superseded, however the guiding principles are still applicable and are also embedded in the current national policies (NPPF). EN-1 confirms that an FRA is required to assess flood risk from all sources for the lifetime of the project by competent people. The FRA would, among other aspects, need to identify flood risk reduction and management measures. Residual risks would also require assessment to consider their acceptability.

2.3.2. In relation to surface water management, EN-1 promotes the appropriate use of SuDS to facilitate the sustainable development of energy developments. The SuDS should aim to prevent an increase in surface water flood risk associated with the increase in discharge from the site.

b) Joint Office for Nuclear Regulation and Environment Agency Principles for Flood and Coastal Erosion Risk Management Advice Note

2.3.3. The Office for Nuclear Regulation and Environment Agency Joint Advice Note sets out *"the approach to flood risk in the nuclear new-build programme in England."* (Ref. 1.2). The note states that flood hazard analysis should be reported to the Environment Agency via planning submissions in the form of FRAs and to the Office for Nuclear Regulation (ONR) in nuclear safety cases.

2.3.4. The principle of the flood risk analysis set out in the note is that all flood risk analysis work would be suitable for both the FRA and nuclear safety case(s).

2.3.5. Appendix D of the Joint Advice Note confirms that for associated development, such as a road constructed as part of a new build project to assist with local transport capacity improvements, *"the most relevant climate change criteria must be applied in accordance with national planning policy".*

c) National Planning Policy Framework and Guidance

2.3.6. The NPPF (Ref. 1.3) sets out the Government's planning policies for England. The NPPF seeks to ensure that flood risk is considered at all stages of the planning and development process, to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk of flooding. Where there are no reasonably available sites in Flood Zone 1, the local planning authority can consider reasonably available sites in Flood Zone 2. Only when there are no reasonably available sites for development in Flood Zones 1 and 2 should the suitability of sites in Flood Zone 3 be considered.

2.3.7. In addition, the NPPF states that "*the development should be made safe for its lifetime without increasing flood risk elsewhere*." For a development to be considered acceptable with regards to flood risk, the sequential test requirements must be satisfied, along with demonstrating the development:

- within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

- is appropriately flood resistant and resilient;
- it incorporates SuDS, unless there is clear evidence that this would be inappropriate;
- any residual risk can be safely managed; and
- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

2.3.8. Further details of the requirements for sequential testing and sustainable drainage are provided in the following two sections.

i. Sequential Testing

2.3.9. The National Planning Practice Guidance on Flood Risk and Coastal Change (Ref. 1.4) supports the NPPF with additional guidance on flood risk vulnerability classifications and managing residual risks. The National Planning Practice Guidance provides further description of Flood Zones (**Table 2.1**), Vulnerability Classifications (**Table 2.2**) and Compatibility Matrix (**Table 2.3**) in order to assess the suitability of a specific site for a certain type of development.

Table 2.1 Summary of flood zone definitions

Flood zone	Probability of flooding	Return periods
1	Low	Land having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
2	Medium	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%); or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%).
3a	High	Land having a 1 in 100 or greater annual probability of river flooding (≥1%); or Land having a 1 in 200 or greater annual probability of sea flooding (≥0.5%).
3b	High – Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on Flood Maps).

Table 2.2 Summary of flood risk vulnerability classifications

Vulnerability classification	Description
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable	• Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'essential infrastructure').
More Vulnerable	• Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities).

Vulnerability classification	Description
	• Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water Compatible Development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 2.3 Flood risk vulnerability and flood zone 'Compatibility'

Flood risk vulnerability classification (see table d2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood Zone (see Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	×	×	×

Key:
✓ Development is appropriate × Development should not be permitted

2.3.10. Following application of the Sequential Test, if it is not possible (consistent with wider sustainability objectives) for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied, if appropriate.

2.3.11. For the Exception Test to be passed it must be demonstrated that based on a site-specific FRA:

- the development provides wider sustainability benefits to the community that outweigh flood risk; and
- the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

2.3.12. Where the Exception Test is applied, both elements of the Exception Test will have to be passed for development to be permitted. Within each flood zone, surface water and other sources of flooding also need to be taken into account in applying the sequential approach to the location of development.

ii. Sustainable drainage

2.3.13. The National Planning Practice Guidance on Flood Risk and Coastal Change (Ref. 1.4) supports the NPPF with additional guidance on flood risk, which states that "*developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally*."

2.3.14. In order to manage surface water on the site, it is necessary to consider the appropriateness of a various SuDS measures, using the SuDS hierarchy set out in the National Planning Practice Guidance (Ref. 1.4).

2.3.15. The aim should be to discharge surface run off as high up the drainage options hierarchy as reasonably practicable. These are listed with the most favourable option first and least preferable last;

"1. into the ground (infiltration);

2. to a surface water body;

3. to a surface water sewer, highway drain, or another drainage system;

*4. to a combined sewer.” (*Paragraph 80, Ref. 1.4).

2.3.16. The National Planning Practice Guidance acknowledges that some types of SuDS may not be practicable in all locations. Locations may be constrained in areas of flood risk.

2.3.17. The Environment Agency classifies surface water flood risk (Ref. 1.18) into four categories; ‘very low’, ‘low’, ‘medium’ and ‘high’ (**Table 2.4**).

Table 2.4 Summary of flood risk from surface water definition

Probability of surface water flooding	Return periods
Very low	Land with less than 1 in 1,000 annual probability of surface water flooding (<0.1%).
Low	Land with between 1 in 1,000 and 1 in 100 annual probability of surface water flooding (0.1% - 1%).
Medium	Land with between 1 in 100 and 1 in 30 annual probability of surface water flooding (1% - 3.3%).
High	Land with greater than 1 in 30 annual probability of surface water flooding (>3.3%).

d) Flood Risk Assessments: Climate Change Allowances

2.3.18. The Environment Agency’s online advice note ‘FRAs: Climate Change Allowances’ was published in February 2016 and amended in April 2016, February 2017 and February 2019. The guidance has since been updated in December 2019 to take account of updated guidance on:

“1) Updated the sea level rise allowances using UKCP18 projections.

2) Added guidance on how to a) calculate flood storage compensation, b) use peak rainfall allowances to help design drainage systems, c) account for the impact of climate change on storm surge, d) assess and design access and escape routes for less vulnerable development.

3) Changed the guidance on how to apply peak river flow allowances so the approach is the same for both flood zones 2 and 3.” (Ref. 1.5).

2.3.19. This advice note provides guidance for determining appropriate climate change allowances for fluvial, tidal and peak rainfall intensities. The climate change allowances consider the geographical location, life span of the proposed development, flood risk, vulnerability classification associated with the type of development and critical drainage areas.

2.3.20. Guidance is provided for determining appropriate climate change allowances for peak fluvial flows and peak rainfall intensities as presented in **Plate 2.1** to **Plate 2.2** respectively.

Plate 2.1: Extract from Table 1 of Environment Agency guidance on climate change allowances – peak river flow allowance

River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Northumbria	Upper end	20%	30%	50%
	Higher central	15%	20%	25%
	Central	10%	15%	20%
Humber	Upper end	20%	30%	50%
	Higher central	15%	20%	30%
	Central	10%	15%	20%
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%

Plate 2.2: Extract from Table 2 of Environment Agency guidance on climate change allowances – peak rainfall intensity allowance

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

e) Environment Agency pre-development guidance

2.3.21. As part of the Sizewell C early engagement process, pre-development discussions were undertaken with the Environment Agency. The Environment Agency confirmed that:

> *"if the change in depth is less than 30mm (3cm), compensatory storage is not usually required. However, this must be assessed on a case by case basis and other factors such as velocity, hazard, duration, rate of onset and change in flood extent should still be assessed."* (Ref. 1.22)

2.3.22. The ONR and Environment Agency Joint Advice Note sets out "*the approach to flood risk in the nuclear new-build programme in England*" (Ref. 1.2). Appendix D of the Joint Advice Note confirms that for associated development such as a road constructed as part of a new build project to assist with local transport capacity improvements, "*the most relevant climate change criteria must be applied in accordance with national planning policy*". In accordance with NPPF, and in consultation with the Environment Agency, the assessment of the future on-site flood risk in relation to road safety and design, has been undertaken by applying the 1 in 100 year with 65% climate change allowance. The 1 in 100 year with 35% climate change allowance has been applied for the assessment of off-site flood risk.

2.4 Local plans

a) Suffolk Coastal Local Plan

i. Final Draft Proposed Local Plan

2.4.1. On 1 April 2019, East Suffolk Council (ESC) was created, merging the former districts of Suffolk Coastal District Council (SCDC) and Waveney District Council. Prior to this date Suffolk Coastal and Waveney District Councils worked in partnership to produce various policy documents. These documents are referred to here by their published names and references authors as they were at the time of their publication.

2.4.2. The ESC is in the process of replacing the former SCDC Local Plan. The final draft of the new local plan was published, and a six-week period set for the receipt of representations in relation to legal compliance and soundness between 14 January 2019 and 25 February 2019. The SCDC have previously stated that the adoption of the plan is scheduled for Spring 2020. This local plan covers only the geographical area formerly within the SCDC boundary.

ii. Existing Local Plan

2.4.3. The existing SCDC Local Plan sets out how the area should be developed. It incorporates the Core Strategy and Development Management Policies and Saved Policies from the Suffolk Coastal Local Plan (incorporating the First and Second Alterations) (Ref. 1.7). These documents form part of the formal Development Plan and are used in the determination of planning applications.

2.4.4. Two strategic policies and one development management policy have been identified as relevant for the proposed development, as outlined within **Table 2.5**. No reference to the allocation of the site has been found in the SCDC Local Plan.

Table 2.5 Relevant Suffolk Coastal Local Plan policies

Policy Number	Policy Name	Summary
SP10	A14 & A12	The Council supports the provision of improvements to the A12.
SP12	Climate Change	The District Council will contribute towards the mitigation of the effects of new development on climate change by minimising the risk of flooding and ensuring appropriate management of land within floodplains.
DM28	Flood Risk	Proposals for new development, or the intensification of existing development, will not be permitted in areas at high risk from flooding, i.e. Flood Zones 2 and 3, unless the applicant has satisfied the safety requirements in NPPF (and any successor).

b) Suffolk Flood Risk Management Strategy

2.4.5. Suffolk County Council is responsible for coordinating a partnership approach to flood and coastal risk management with all risk management authorities in Suffolk. They do this through the Suffolk Flood Risk Management Partnership who produced the Local Flood Risk Management Strategy (Ref. 1.1) in March 2016.

2.4.6. The objective of the strategy is *"to take a pragmatic approach to reduce the current flood risk and ensure that we do nothing to make this worse in the future."* This objective is in accordance with the principles laid out in the NPPF.

2.4.7. Seven objectives of the Local Flood Risk Management Strategy have been identified, two of which are of relevance to the proposed development site:

- Objective 3: To prevent an increase in flood risk as a result of development by preventing additional water entering existing drainage systems wherever possible.
- Objective 4: Take a sustainable and holistic approach to flood and coastal management, seeking to deliver wider economic, environmental and social benefits, climate change mitigation and improvements under the Water Framework Directive.

3 Development description and scope of this assessment

3.1 The existing site

3.1.1. The Sizewell link road (herein referred to as 'the site' or 'the proposed development') is approximately 101 ha in size, located approximately 1.8km south of Yoxford, running a total of 6.8km in an easterly direction where it re-joins the B1122 to the east of Theberton (**Plate 3.1**). The site is approximately 2.8km to the north-west of the main development site at its closest point. The site is predominantly located on agricultural land. The site is to the south of Yoxford, Middleton and Theberton villages and runs west to east. The site crosses six watercourses at seven locations.

3.2 The proposed site masterplan and design

3.2.1. The site comprises approximately 101 ha of primarily agricultural land, as well as highway land and hard standing. The route of the Sizewell link road would bypass a section of the B1122 with a new 6.8km single carriageway road to the south-west. The proposed road would be 7.3m wide, with additional 1m hard strips and 2.5m wide verges. Along the route of the Sizewell link road, there would be swales approximately 3.5m wide for highway drainage, with a 5m grassed area between earthworks and fencing. The design also includes for watercourse relief basins, if required, adjacent to each of the six watercourses crossed by the proposed development.

3.2.2. The route of the proposed Sizewell link road would connect to the A12, via a new roundabout located approximately 180m north of The Red House Farm, south of Yoxford. The proposed road would continue in a north-easterly direction at existing ground level towards the East Suffolk line. This section of the proposed road would be approximately 1.5km in length.

3.2.3. The route would then continue in an easterly direction for approximately 1.2km, crossing over the existing East Suffolk line, intersecting Littlemore Road, and then continuing towards Middleton Moor and Fordley Road. With the exception of the East Suffolk line crossing, the proposed road would be at grade level until it meets the Middleton Moor link, after which it would be on an approximate 3.5m high embankment for approximately 200m.

3.2.4. South of Hawthorn Road, the route of the proposed Sizewell link road continues for 1.3km in a south-east direction intersecting Plumtreehills Covert in a 2m cutting to Pretty Road.

3.2.5. The route of the proposed Sizewell link road would continue from Pretty Road for approximately 1.5km, curving east and intersecting Moat Road before joining the B1122 south of Browns Plantation.

3.2.6. The existing B1122 road will remain in situ following construction of the proposed Sizewell link road.

3.2.7. It is envisaged that 11 infiltration basins would be located along the length of the site. These infiltration basins would operate to attenuate highways drainage only. The exact location, footprint and depth of these basins is to be confirmed at the detailed design stage, however the infiltration basins would be designed to cater for a 100-year flood event plus a 40% allowance for climate change. The infiltration basins would not be sited within the floodplain of the watercourses.

3.3 Topography

3.3.1. **Figure 1** provides remotely sensed Light Detection and Ranging (LiDAR) data (Ref.1.9) to show the topography of the site.

3.3.2. The linear nature of the site results in an undulating topography as the proposed link road crosses multiple small river valleys.

3.3.3. Overall the site slopes from west to east. The highest elevations are found at the western extent of the site at approximately 40m above ordnance datum (AoD). Elevation remains at this level moving east between the A12 and the East Suffolk line.

3.3.4. To the east of the East Suffolk line the topography becomes more varied with 6 depressions passed before the eastern end of the site boundary is reached. These are identified from west to east at; Fordley Road, an unnamed track west of Garden House Farm, Wash Lane (Track), an unnamed track south of the B1122, an unnamed track south-west of Theberton and on the B1122 south of Theberton.

3.3.5. The lowest elevations within the site boundary are found on the B1122 south of Theberton, where they are approximately 6.6m AoD.

3.4 Geology

3.4.1. British Geological Survey (BGS) online geology viewer (Ref.1.10) mapping show the Crag Group (marine deposits) as the dominant solid geology type found in the study area.

3.4.2. The BGS map records the main superficial geology for much of the site as the lowestoft formation (diamicton); unsorted material from a local environment previously dominated by ice age conditions.

3.4.3. Where the proposed route passes across lower elevations relating to historical or existing water courses, superficial geology changes from lowestoft formation sand and gravel to head sand and gravel and then back to the lowestoft formation (diamicton) as elevation increases once more.

3.4.4. This occurs in four locations; at Wash Lane (Track), at the unnamed track south of the B1122, at the unnamed track south-west of Theberton and on the B1122 south of Theberton.

3.4.5. The Suffolk Coastal and Waveney District Councils Strategic Flood Risk Assessment (SFRA) (Ref.1.11) states that *"towards the east of the District the main soil types are deep well-drained sandy soils, deep well-drained sandy often ferruginous soils and deep stone less non-calcareous and calcareous clayey soils. These soil types allow free drainage."*

3.4.6. Further infiltration testing will be undertaken to confirm the permeability and inform the detailed design.

3.4.7. The Aquifer Designation map (Ref.1.12) indicates the bedrock geology of the area is classified as a 'principal' aquifer. Principal aquifers are defined by the Environment Agency as *"geology that exhibit high permeability and/or provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale".*

3.4.8. The Aquifer Designation map classifies much of the superficial geology as a 'secondary undifferentiated' aquifer. Secondary undifferentiated aquifers are defined in cases where it has not been possible to attribute either category A or B to a rock type.

3.4.9. At the eastern extent of the site, the Aquifer Designation map classifies parts of the geology as a 'secondary A' aquifer. Secondary A aquifers are permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers. However, due to the zoom scales available for this data source, it was not possible to accurately distinguish how this interacts with the site boundary.

3.4.10. The Groundwater Vulnerability map (Ref.1.13) indicates that much of the site is located in an area defined as a minor aquifer with low vulnerability. Areas to the east of the site are a mixture of minor aquifer with 'high' and 'intermediate' vulnerability.

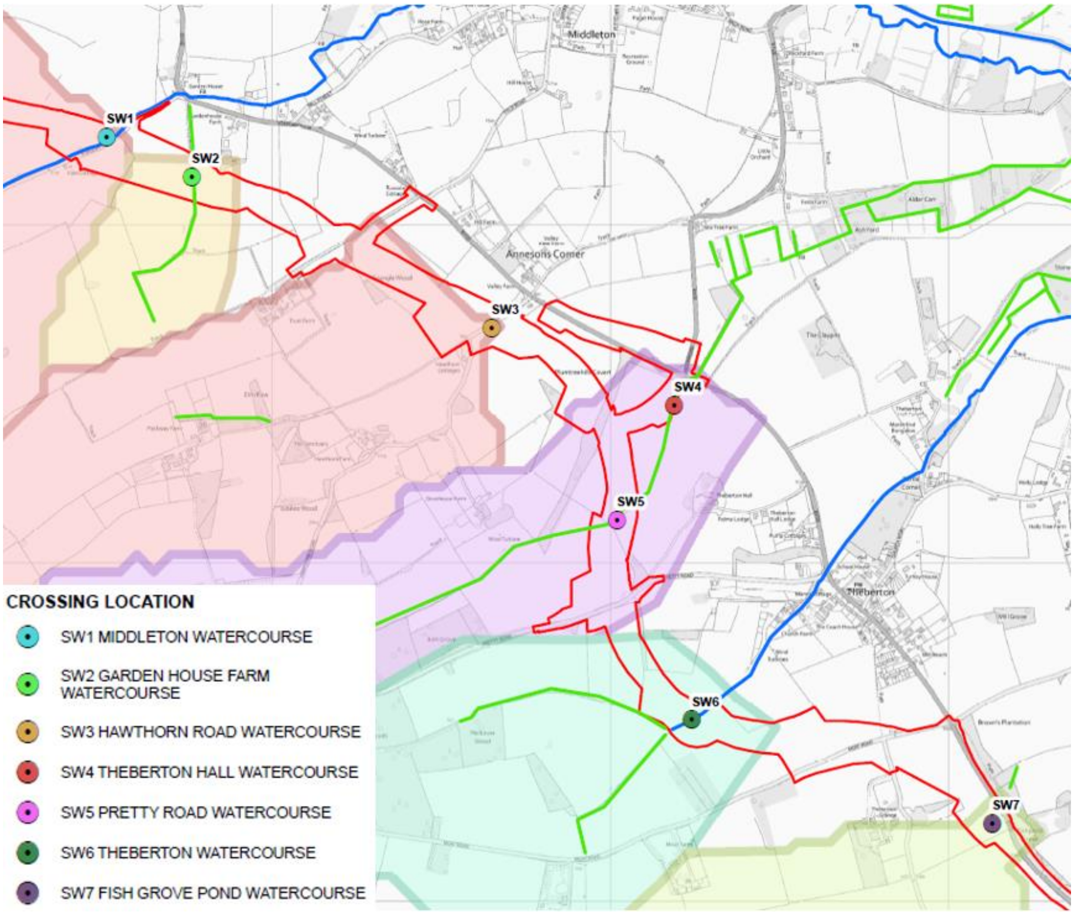
3.4.11. Groundwater vulnerability classification is a product of soil type and the underlying geology; however, the depth to groundwater is not considered. The Groundwater Vulnerability map is intended to *"indicate where groundwater resources may be vulnerable from activities carried out on the surface land".*

3.5 Hydrology

3.5.1. The proposed development will cross six watercourses west to east at seven locations along its route. To aid the discussion of the watercourses within this FRA, they have been numbered sequentially from west to east starting at SW1 and finishing at SW7. The locations of these watercourse crossings are displayed in **Figure 4**. The name and classification of each watercourse is listed below:

- SW1: Middleton Watercourse, Fordley Road (main river).
- SW2: Garden House Farm Watercourse (ordinary watercourse).
- SW3: Hawthorn Road Watercourse (ordinary watercourse).
- SW4: Theberton Hall (ordinary watercourse).
- SW5: Pretty Road Watercourse crossing (same ordinary watercourse as SW4).
- SW6: Theberton Watercourse, Moat Road (main river).
- SW7: Fish Grove Pond Watercourse (ordinary watercourse).

Plate 3.1. Extract from Figure 4 Sizewell link road watercourse crossing locations.



3.5.2. The site is entirely located in the Minsmere Old River catchment (Ref.1.14).

3.5.3. Environment Agency 'main rivers' are usually larger rivers and streams which the Environment Agency have permissive powers to maintain and improve. The Environment Agency also has the powers to improve and construct work on main rivers to manage flood risk. However, it does not have a duty to carry out flood and coastal risk management work. **Figure 4** identifies all 'main rivers' that are near to the site boundary.

3.5.4. There are two main rivers which intersect the site boundary, both tributaries of the Minsmere Old River, which are:

- SW1 - the Middleton Watercourse at Fordley Road; and
- SW6 - the Theberton Watercourse, adjacent to an unnamed track to the south-west of Theberton adjacent Moat Road.

3.5.5. The remaining five watercourse crossings are of ‘ordinary watercourses’. Ordinary watercourses are the remaining watercourses which are not classed as main rivers. Lead local flood authorities, local authorities and Internal Drainage Boards, where applicable, have powers to carry out flood risk management work on ordinary watercourses. These are:

- SW2 - Garden House Farm Watercourse, runs south to north, joining the Middleton Watercourse main river tributary at the junction of Fordley Road and the B1122.
- SW3 - Hawthorn Road, runs south to north, adjacent the B1122, approximately 1km south of Middleton at Annesons Corner.
- SW4 - Theberton Hall, located approximately 750m north-west of Theberton running south to north parallel the site boundary, where the proposed link road will connect with the B1122 and the B1125 from the north.
- SW5 - Pretty Road Watercourse crossing, same watercourse as SW4, crosses the site boundary approximately 700m to the west of Theberton.
- SW7 - Immediately west of the B1122 at the southern extent of the link road.

3.5.6. Review of ordnance survey (OS) mapping has identified eight ponds within the site boundary. The ponds are not associated with existing surface water flow paths (**Figure 3**).

3.5.7. Information on licensed groundwater abstractions is provided in **Volume 6, Chapter 12** of the **ES**. This shows that there are 9 licensed abstractions within 1km of the site. Any infiltration basin would be positioned away from these abstraction points. A Highways Assessment Water Risk Assessment Tool assessment would be undertaken at the detailed design stage to determine the compliance with water quality requirements of the roads.

3.5.8. The site is not located within a source protection zone, with the closest some 1.5km to the south (Ref.1.16).

3.6 Watercourse crossings

a) Introduction

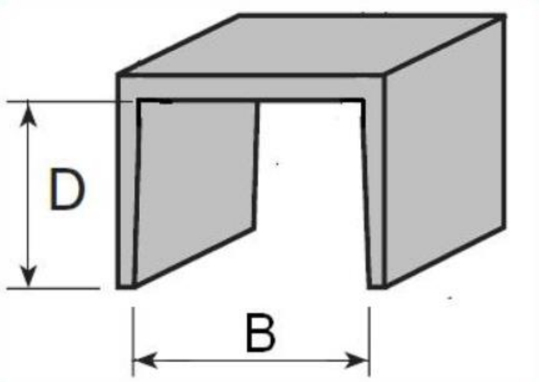
3.6.1. The proposed development will require seven crossings over six watercourses. Initial modelling undertaken (**Table 3.1)** highlighted that flows stay within the channel for most crossings. The decision was made that any solution should be designed to not encroach into the channel, preventing the restriction of flows.

Table 3.1 Summary of Sizewell link road hydraulic modelling undertaken for the watercourse crossings

Crossing Number	Crossing Name (Watercourse Status)	Hydraulic Modelling Undertaken
SW1	Middleton Watercourse (main river)	1D modelling
SW2	Garden House Farm Watercourse (ordinary watercourse)	1D modelling
SW3	Hawthorn Road Watercourse (ordinary watercourse)	1D modelling
SW4	Theberton Hall (ordinary watercourse)	No change to existing culvert
SW5	Pretty Road Watercourse crossing (ordinary watercourse, same watercourse as SW4)	1D modelling
SW6	Theberton Watercourse (main river)	1D modelling
SW7	Fish Grove Pond Watercourse (ordinary watercourse)	Limited information available on existing infrastructure. Mapping indicates potential for existing surface water flow route over the B1122. Proposed design concept developed to mitigate crossing impact in place. Hydraulic structures to be sized at detailed design stage.

3.6.2. The current proposed design for the watercourse crossings will use a series of three-sided portal culverts, 5.4m wide (marked as ‘B’ in **Plate 3.2**) by 1.2m high (marked as ‘D’ in **Plate 3.2**). Portal culverts (**Plate 3.2**) were chosen over more widely used box culverts as they allow the bed and channel to remain natural, which removes the requirement for ledges to allow dry mammal passage beneath the Sizewell link road.

Plate 3.2. Sketch of a typical portal culvert (not to scale)



3.6.3. Further details related to the hydrological inputs and hydraulic modelling carried out to assess the impact of the proposed watercourse crossings is set out in the Sizewell Link Road Hydraulic Modelling Report, provided in **Appendix A** of this document. The information from the hydraulic modelling process has been used to assess flood risk to and from the proposed development throughout this FRA.

3.6.4. The design includes for watercourse relief basins, if required, adjacent to each of the six watercourses, located upstream of crossings SW1, SW2, SW3, SW5, SW6 and SW7. Although only limited design details were available, and therefore could not be included in the hydraulic modelling, these have been considered within this flood risk assessment. The modelling results therefore present a conservative approach.

3.6.5. Infiltration ponds collecting and attenuating the surface water run-off from the proposed road are planned along its length. It is proposed that infiltration ponds would only be used for surface water runoff management and not for flows from the watercourses.

3.6.6. Details of the location, connectivity and capacity of the infiltration ponds and watercourse relief basins would be derived at the detailed design stage of the project.

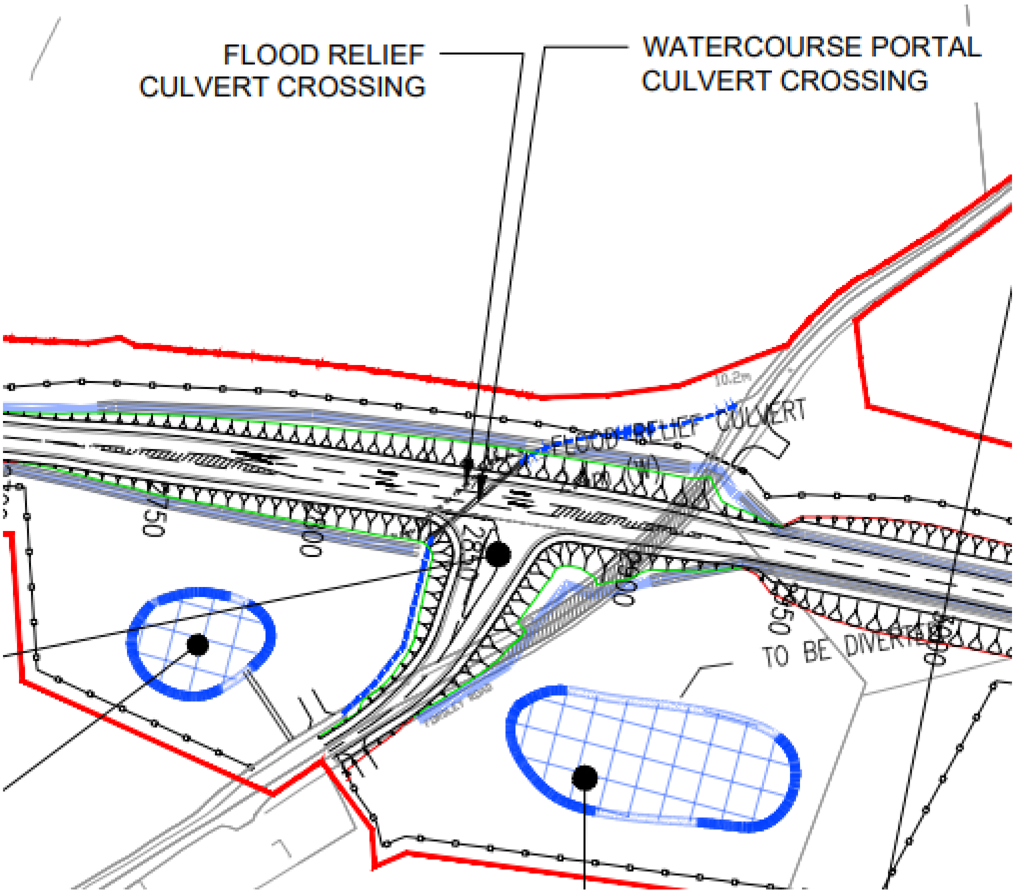
3.6.7. Each of the watercourses require specific design solutions to account for the local site and hydraulic conditions. This section focuses on the proposed design of the watercourse crossings. Results of the hydraulic modelling are presented in **section 7** of this report.

a) SW1 – Middleton watercourse crossing design

3.6.8. The current location of the Middleton watercourse coupled with the existing and proposed highway infrastructure would require culverts beneath two roads. To remove the need to culvert beneath these two roads (Fordley

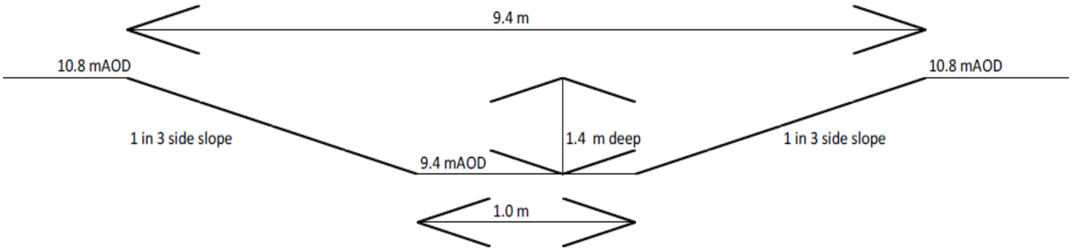
Road and the proposed Sizewell link road), it is proposed that the Middleton Watercourse at SW1 would have a new channel constructed, diverting to the west of Fordley road. This avoids the need for the culvert under Fordley road and reduces the length of the culvert under Sizewell link road (**Plate 3.3**). The design includes for a watercourse relief basin on the left bank.

Plate 3.3. Proposed layout of SW1 crossing at Fordley Road. (Source: Extract from Book 6, Volume 6, Chapter 2, drawing SZC-SZ0204-XX-000-DRW-100057_P13 in the ES)



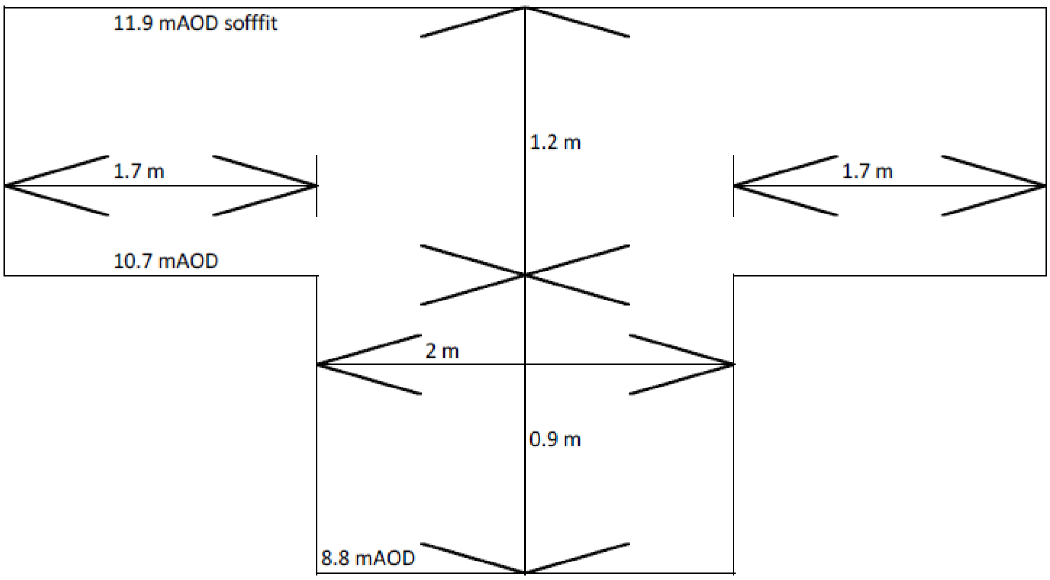
3.6.9. Either side of the Sizewell link road the new channel (**Plate 3.4**) would have a 1 in 3 side slope and be 1.4m deep. It is proposed the channel bed would be 1m in width and the full channel would be 9.4m wide.

Plate 3.4. Proposed cross-section of the diverted channel at crossing SW1 (Source: Extract from the Sizewell Link Road Hydraulic Modelling report (Appendix A))



3.6.10. At the Middleton watercourse crossing for the Sizewell link road, two culverts are proposed to provide suitable flow capacity. The first culvert would be a T-Shaped portal culvert (**Plate 3.5**). This culvert would have a lining of natural material on the bottom and the ledges to retain the ecological properties of the existing watercourse.

Plate 3.5. Proposed cross-section through the portal culvert at crossing SW1. (Source: Extract from the Sizewell Link Road Hydraulic Modelling report (Appendix A))

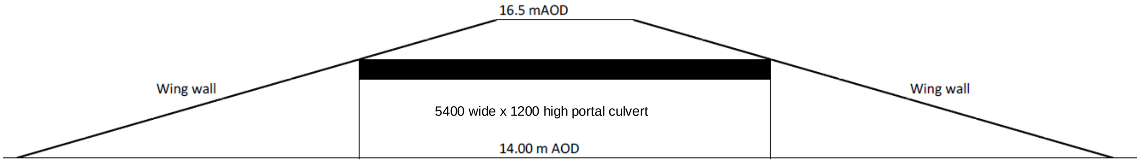


3.6.11. A second culvert situated within the floodplain (at a higher elevation than the channel bed level), would be a box culvert with dimensions of 2.4m by 1m. The second culvert is in addition to the portal culvert to maintain floodplain conveyance and act as flood relief structure.

b) SW2 – Garden House Farm watercourse crossing design

3.6.12. At the Garden House Farm watercourse, a 3-sided portal culvert, 5.4m wide by 1.2m high (from bank level) is proposed (**Plate 3.6**). The design includes for a watercourse relief basin on the right bank.

Plate 3.6. Proposed layout at crossing SW2 (Source: Extract from the Sizewell Link Road Hydraulic Modelling report (Appendix A))



c) SW3 – Hawthorn Road watercourse crossing design

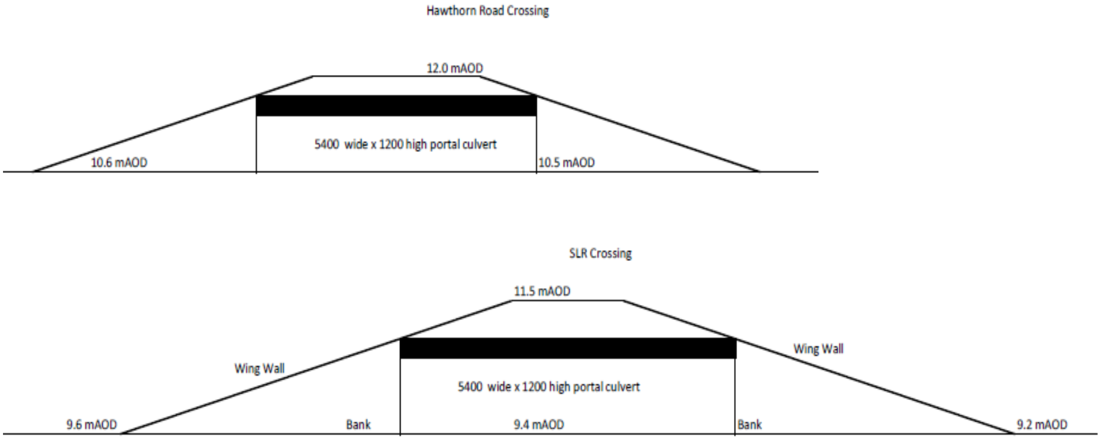
3.6.13. At the Hawthorn Road watercourse, the existing road culvert upstream of the proposed link road would remain unchanged. Two new road crossings would be provided at this location. The first would serve the new road that connects the existing road with the proposed link road. The second road crossing would serve the proposed link road crossing.

3.6.14. A new portal culvert would be constructed (**Plate 3.7**) under both the connector road and the link road. To increase flow capacity, a box culvert (2.4m x 1m) would be built on the floodplain alongside the portal culvert for both of the proposed road crossings. The design includes for a watercourse relief basin on the left bank.

3.6.15. The hydraulic modelling of this crossing does not include the existing Hawthorne Road culvert. Therefore, all flow from the catchment upstream is assumed to flow through the new culvert. This is considered the worst-case flow scenario for assessing the potential impacts of the proposed culvert. This ensures that should the existing culvert be removed in the future, the design of the new culvert would remain appropriate.

3.6.16. The box culverts are designed with ledges to allow mammals to pass beneath the link road and the connector road.

Plate 3.7. Proposed revised layouts at crossing SW3 (Hawthorn Road). (Source: Extract from the Sizewell Link Road Hydraulic Modelling report (Appendix A))



d) SW4 – Theberton Hall watercourse crossing design

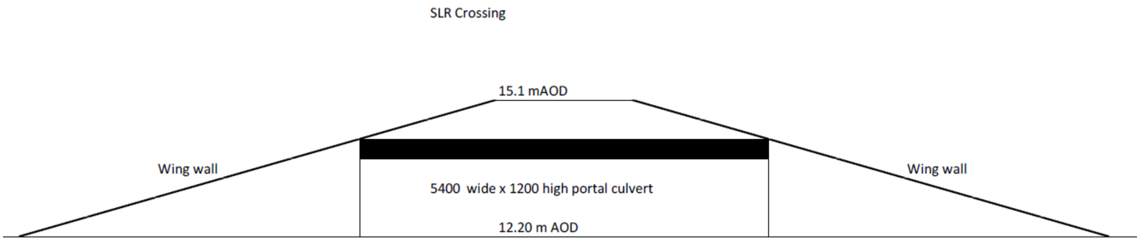
3.6.17. Hydraulic modelling was not undertaken at SW4 for Theberton Hall watercourse crossing, as further details on the road layout design confirmed that the existing culvert would not be altered during the proposed construction.

3.6.18. The proposed road levels would remain similar to the existing road levels before tying in with the surrounding elevations. The upstream flow is assumed would remain the same as the baseline scenario once the link road is constructed.

e) SW5 – Pretty Road watercourse crossing design

3.6.19. At the Pretty Road watercourse crossing, a three-sided portal culvert, 5.4m wide by 1.2m high (from bank levels) is proposed (**Plate 3.8**). The design includes for a watercourse relief basin on the right bank.

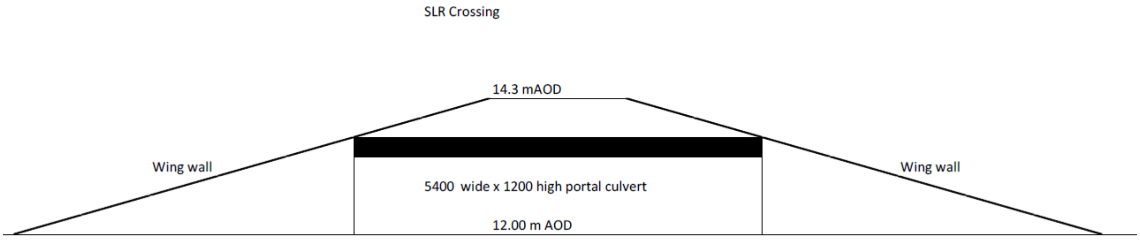
Plate 3.8. Proposed layout at crossing SW5. (Source: Extract from the Sizewell Link Road Hydraulic Modelling report (Appendix A))



f) SW6 – Theberton watercourse Moat Road crossing design

3.6.20. At the Theberton watercourse main river, a three-sided portal culvert, 5.4m wide by 1.2m high (from bank levels) is proposed (**Plate 3.9**). The design includes for a watercourse relief basin on the right bank.

Plate 3.9. Proposed layout at crossing SW6. (Source: Extract from the Sizewell Link Road Hydraulic Modelling report (Appendix A))



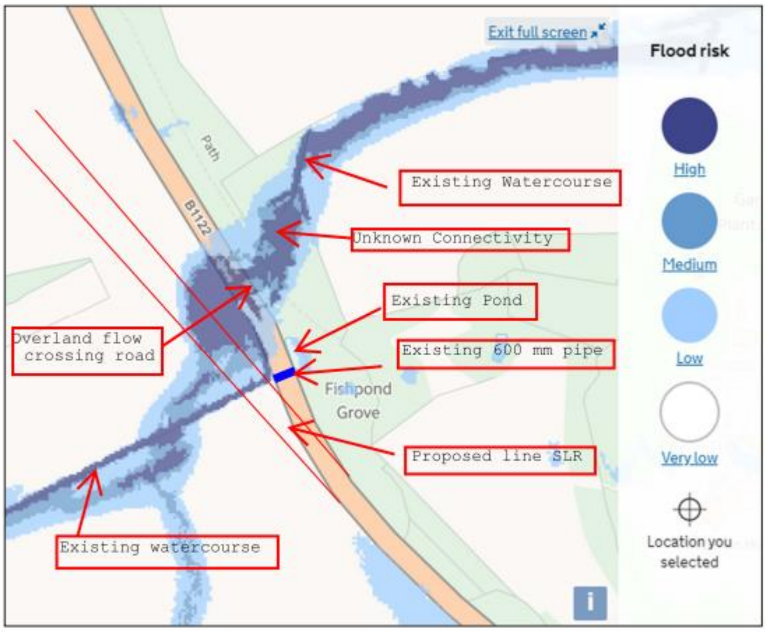
g) SW7 – Fish Grove Pond watercourse crossing design

3.6.21. Hydraulic modelling was not undertaken at SW7 for Fish Grove Pond. A drain runs alongside the public right of way with approximately 600mm diameter piped culvert that runs beneath the B1122. However, this is not sited at bed level within the watercourse. No additional information is available for the existing culvert at this time. Further information about the culvert details would be obtained through surveys to inform further design studies at the later stages of the Sizewell C Project.

3.6.22. The proposed design would extend, but not change the size of the existing pipe. Therefore, there would be no increase of water discharged downstream.

3.6.23. Attenuation would be provided upstream of the existing pipe location to manage any potential off-site impacts associated with the construction of the proposed link road. Any attenuation to manage the flood risk associated with the watercourse would be provided in a separate area from infiltration basins. This would result in the infiltration basins being out of the watercourse floodplain and dedicated to attenuating highway surface water run-off.

Plate 3.10. The surface water flood risk at the proposed layout at crossing SW7 Fish Grove Pond watercourse crossing (Source: Extract from the Sizewell Link Road Hydraulic Modelling report (Appendix A))



3.6.24. A review of the Environment Agency Risk of Surface Water Flooding maps (Ref.1.18) (**Figure 3**) indicates an existing flow route over the road at the proposed SW7 road crossing. The surface water ponds upstream to the west of the B1122 and to the north of the existing culvert before flowing across a topographical low on the existing B1122.

3.6.25. The proposed design would include a watercourse relief basin upstream of the crossing, on the left bank. The proposed design would also include a flood relief culvert where surface water is currently shown to overflow the existing road. It is possible that due to the high-level national scale modelling approach which is unlikely to have included the culvert under the road, the overflow over the road may not actually occur, or may be less. These hydraulic structures would be sized sufficiently at a detailed design stage to mitigate any potential impact of the proposed road crossing.

4 Flood risk appraisal

4.1 Historical flooding

4.1.1. The ESC SFRA historic flood record maps provide location points for recorded historic flood events from fluvial, tidal, sewer, groundwater, highway drainage and surface water sources (Ref.1.11). Absence of records does not necessarily confirm that no flooding has occurred.

4.1.2. These maps identify one case of historic flooding from an unknown source which occurred immediately adjacent to the site, on the Fordley Road Middleton watercourse main river, a tributary of the Minsmere Old River.

4.1.3. There is a history of flooding at Fordley Road with the most recent event occurring in November 2019, during which records show the watercourse at Fordley Road was full to capacity and flooding the road, although the return period is unknown. There is a known erosion issue at the current road crossing downstream of the link road. The Environment Agency and SCC have stated that the proposed development should not exacerbate this issue.

4.2 Tidal / coastal flood risk

4.2.1. The Flood Map for Planning (Ref.1.17) shows the site is almost entirely in Flood Zone 1 (**Figure 2**). The Minsmere Flood Risk Management Study (January 2009) confirms the site boundary is beyond the tidal flood extent (Ref.1.19).

4.2.2. The risk of flooding from tidal or coastal sources is therefore considered to be low.

4.3 Fluvial flood risk

4.3.1. A review of the Flood Map for Planning, published by the Environment Agency for planning purposes, has been carried out and the current mapping shows the site is mainly in Flood Zone 1 (**Figure 2**).

4.3.2. Review of Flood Zone 3b (functional floodplain) data shows the closest Flood Zone 3b extent is adjacent to the Minsmere Old River, which is 750m to the north-east of the site at the closest point (Ref. 1.11).

4.3.3. The existing mapping shows there is a 70m section of the site (**Figure 2**) within Flood Zone 3. This area of Flood Zone 3 is associated with the Theberton watercourse, a tributary of the Minsmere Old River, that runs across the site adjacent to Fordley Road. The site includes an area of Flood Zone 3 near the Fordley Road junction with the B1122.

4.3.4. To consider the potential localised impact on fluvial flood risk as a result of the proposed development a hydraulic modelling exercise has been carried out. Further information related to the results of the hydraulic modelling are summarised in **section 7.3** of this assessment.

4.3.5. Based on the Environment Agency information on fluvial flood risk the risk of flooding from fluvial sources is considered to be low. It is noted that detailed modelling may not have been carried out to properly delineate these fluvial flood zones around the upper end of the catchments where the crossings are proposed. Given this assessment relies on site-specific hydraulic modelling rather than Environment Agency information on fluvial flood risk, it is not considered that this poses a limitation on this assessment.

4.3.6. The impacts of the proposed development on the associated watercourses are discussed in **section 4.4** of this assessment as part of surface water flood risk and through modelling of the crossings carried out and discussed in **section 7** of this assessment**.**

4.4 Surface water (pluvial) flood risk

4.4.1. **Figure 3** provides the Environment Agency 'long term flood risk map' dataset (Ref.1.18), which identifies the risk of surface water flooding to the site. The Environment Agency's flood map does not take account of the possible impacts of climate change and consequent changes in the future probability of surface water flooding.

4.4.2. The figure indicates the majority of the site is at 'very low' risk of surface water flooding.

4.4.3. Due to the size of the site, areas of 'low' risk of surface water flooding are not identified individually in this FRA, due to their low impact and scattered locations. These low risk areas are visible in **Figure 3**.

4.4.4. The key areas within the proposed development identified as having a surface water flood risk are related to the watercourses. From west to east, areas of 'medium' to 'high' surface water flood risk are:

- isolated areas of 'medium' risk along Littlemoor Road;
- a potential surface water flow route across the B1122, north of Littlemoor Road and west of Middleton Moor;

- large areas of 'medium' and 'high' risk associated with the Environment Agency main river on Fordley Road;
- small areas of 'low' risk related to the ordinary watercourse (Garden House Farm) that joins the Fordley Road main river at the B1122;
- area of 'medium' and 'high' risk along Hawthorn Road associated with the Hawthorn Road watercourse;
- areas of 'low' and 'medium' risk associated with the Pretty Road watercourse that crosses the site boundary at both the B1122/B1125 junction and to the south in the location of the proposed link road;
- areas of 'medium' and 'high' risk associated with the Environment Agency main river north of Moat Road;
- large area of 'medium' risk towards the southern extent of the site, associated with the Fish Pond Grove watercourse.

4.4.5. Due to the high risk of surface water flooding associated with the watercourse crossing locations, hydraulic modelling has been undertaken to assess and mitigate the risk at each crossing provided in **Appendix A** of this document.

4.5 Groundwater flood risk

4.5.1. According to the BGS Geology of Britain viewer (Ref.1.10) and the SFRA (Ref.1.11), the main soil types in the area are significantly permeable. Permeable soils have the potential to present groundwater flooding problems in areas with a high water-table.

4.5.2. The BGS Susceptibility to Groundwater Flooding map from the SFRA (Ref. 1.11) identifies there is 'limited potential for groundwater flooding' to occur for almost the entire site.

4.5.3. There is one isolated location where there is potential for groundwater flooding. This is located near the watercourse on Fordley Road, approximately 1.2km southwest of Middleton. However, this groundwater flood risk is only for property situated below ground level and therefore does not affect the proposed development.

4.5.4. The SCC's Preliminary Flood Risk Assessment (PFRA) indicates that *"there is no consistent local information available which provides evidence of possible future groundwater flood risk in Suffolk"* (Ref. 1.20). The SFRA has no records of any groundwater incident in the area.

4.5.5. Hydrogeological data is summarised in **Volume 6, Chapter 12** of the **ES** and demonstrates that groundwater ranges approximately 9-18m below ground level.

4.5.6. It is therefore concluded that the risk of groundwater flooding to the site is low.

4.6 Sewer flood risk

4.6.1. The site is currently an undeveloped greenfield site with an agricultural use. There is therefore no existing risk of internal flooding from sewer sources on site.

4.6.2. The Suffolk Coastal and Waveney District Councils Level 1 SFRA does not identify any flooding to have occurred on site from foul or surface water sewers. The SFRA also does not identify any flooding from highway drainage to have occurred on site or the surrounding highway network.

4.6.3. The risk of sewer flooding to the site is therefore considered to be low.

4.7 Flood risk from reservoirs and other artificial sources

4.7.1. Flooding from reservoirs is defined as an uncontrolled release of water from registered reservoirs, reservoirs with a volume greater than 25,000m^3 held above the existing ground level.

4.7.2. The Flood Risk from Reservoirs map (Ref. 1.21) shows the site is not at risk of reservoir flooding.

4.8 Summary of potential flood mechanisms

4.8.1. **Table 4.1** includes a summary of flood risk to the proposed Sizewell link road site.

Table 4.1: Summary of existing flood risk to the site

Source of flooding	Flood Risk	Description
Tidal/ coastal	Low	Flood Zone 1, Low: less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%)
Fluvial	Low	Flood Zone 1, Low: less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%).
	High	Flood Zone 3, High: Land having a 1 in 100 or greater annual probability of river flooding

Source of flooding	Flood Risk	Description
		(≥1%); Omitted from FRA as the section of the B1122 and Fordley Road that is in Flood Zone 3 is not part of the proposed development.
Surface water (pluvial)	Very Low: Majority of the site	Less than 1 in 1,000 annual probability of surface water flooding in any year (<0.1%).
	High: Seven flow routes associated with existing watercourses	Greater than 1 in 30 annual probability of surface water flooding in any year (>3.3%).
Groundwater	Low	One isolated location, potential for groundwater flooding of property situated below ground level. Near the watercourse on Fordley Road.
Sewers	Low	Greenfield site and surrounding arable land.
Reservoirs and other artificial sources	Low	Not at risk of flooding from reservoirs or other artificial sources.

5 Application of the sequential and exception test

5.1 The Sequential Test

5.1.1. The proposed development is classified as ‘essential infrastructure’ in accordance with the definitions given in **Table 2.2**. Review of the Flood Map for Planning (Ref. 1.17) identifies that the site is in Flood Zone 1 as defined in **Table 2.1**, with a small section adjacent to Flood Zone 3 that has been omitted from the assessment as it is downstream of the relevant crossing and associated works.

5.1.2. The purpose of the proposed development is to help reduce the amount of traffic on the B1122 through Middleton Moor and Theberton during the peak construction phase of the Sizewell C Project, and beyond. The proposed development would offer one of a number of routes to the operational power station. As a result, in line with the guidance in the ONR and Environment Agency Joint Advice Note (Ref. 1.2), the most relevant climate change guidance is that required by the NPPF.

5.1.3. The route of Sizewell link road is to the south of the existing B1122 road which it bypasses, thereby locating it on higher ground and avoiding wider floodplain areas and increased number and scale of watercourse crossings than if the route had been to the north. As a result, the design of the route has followed a sequential approach in terms of flood risk. The proposed development is considered appropriate with the flood risk vulnerability and flood zone compatibility table (**Table 2.3**). Therefore, the proposed development passes the Sequential Test, subject to the Exception Test considerations presented below.

5.1.4. In reference to the Flood Map for Planning Flood Zones (Ref. 1.17), the proposed development passes the Sequential Test. However, it is acknowledged that the proposed highway will cross two main rivers with undefined flood extents and that the existing hydraulic models do not cover the proposed site. Therefore, hydraulic modelling has been undertaken to assess impacts of fluvial flood risk on the proposed crossings and to support their design.

5.2 The Exception Test

5.2.1. As detailed in **section 2.3.11** of this assessment, the proposed development must provide wider sustainability benefits to the community and be supported by a site-specific FRA for the Exception Test to be passed.

5.2.2. The bypassing of the villages, which are located along the existing B1122, would facilitate the movement of heavy goods vehicle traffic to safely and efficiently access Sizewell in relation to the proposed Sizewell C Project.

5.2.3. The proposed development provides sustainability benefits to the community by addressing policy SP10 from the Suffolk Coastal Local Plan (Ref. 1.7). The construction of the link road will bypass a number of villages and significantly reduce through-traffic on the existing B1122.

5.2.4. Therefore, the proposed development is required both as part of the wider Sizewell C Project and also addresses a local development plan policy.

5.2.5. Furthermore, site-specific hydraulic models have been prepared to support the design of the proposed development and this site-specific FRA to minimise the impact of the development and demonstrate that the development will be safe. The assessment shows that the development has very limited, localised and negligible flood impacts on adjacent areas, none of which affects a residential or non-residential building. Mitigation measures at one of the crossings reduces the risk compared to present, as detailed in **section 7.3** of this assessment.

5.2.6. As a result of the modelling exercise and the mitigation measures included within the design it has been demonstrated that the proposed development passes all elements of the Exception Test.

6 Assessment of Climate change

6.1.1. As identified in the previous section, the flood risk posed to the site is mainly from fluvial and surface water sources. Therefore, the climate change allowance to be applied relates to an increase in the intensity of rainfall events and peak river flows.

6.1.2. In accordance with the guidance for associated development given in Appendix D of the Joint Advice Note on flood risk (Ref.1.2), the appropriate climate change criteria to be applied is that in accordance with national planning policy.

6.1.3. The purpose of the proposed development is to help reduce the amount of traffic on the B1122 through Middleton Moor and Theberton during the peak construction phase of the Sizewell C Project, and beyond. The proposed development would offer one of a number of routes to the operational power station. As a result, in line with the guidance in the ONR and Environment Agency Joint Advice Note, the most relevant climate change guidance is that required by the NPPF.

6.1.4. The Environment Agency guidance on climate change allowances for increase in peak fluvial flows considers the geographical location, lifetime of the proposed development, Flood Zone and vulnerability classification associated with the type of development.

6.1.5. The climate change allowances used in the supporting hydraulic modelling for this FRA are based on a 100-year lifetime of development for Sizewell link road. 100 years is considered to be a conservative expected life of such a highway development before replacement or major works to extend its life.

a) Peak river flows

6.1.6. The site is located in the Anglian river basin and climate change allowances used are specific to this river basin. The proposed development is ‘essential infrastructure’ under the NPPF criteria. Therefore, the higher central and upper end climate change scenarios are appropriate.

6.1.7. The 35% and 65% allowances were used in accordance with the climate change guidance. The NPPF requires that the development remains safe through the development’s lifetime. The climate change allowances were applied in accordance to the on-site and off-site flood risks. For epochs beyond 2115 (2080s epoch) no extrapolation was applied.

b) Rainfall intensity

6.1.8. The site is not within a critical drainage area. In accordance with the guidance, both the central and upper end allowances (given in **Plate 2.2**) have been applied within the development of the **Outline Drainage Strategy** provided in **Volume 2, Appendix 2A** of the **Environmental Statement (ES)**, to account for the range of impact both on and off site for the 2060 – 2115 epoch.

7 Future flood risk

7.1 Fluvial modelling

a) Introduction

7.1.1. Flood risk from surface water is variable across the site. The majority of the site is at 'very low' risk of flooding from surface water. However, areas associated with watercourses are at 'high' risk of flooding from this source.

7.1.2. Two crossings (SW4 and SW7) are not considered to change the existing conditions and no impact from the development is foreseen. Consequently, these two crossings have not been modelled.

7.1.3. Individual 1D hydraulic models were developed for each of the five remaining crossings. These models used a combination of the site-specific surveyed river profile data and Environment Agency's LiDAR data. The hydraulic modelling was undertaken to assess the impacts of the proposed development on the on-site and off-site flood risk throughout the design life.

7.1.4. Full details of the construction and results of the modelling can be found in the modelling report.

7.1.5. Note that plates on the following pages may refer to Above Ordnance Datum (AOD) as "AD" or "AoD", due to default settings in the software.

Table 7.1 High level summary of the hydraulic modelling results for 1 in 100-year event +35% and 65% allowance for climate change

Crossing Number	Name	Hydraulic Modelling Results	
		1 in 100-year + 35% Climate Change (m)	1 in 100-year + 65% Climate Change (m)

Crossing Number	Name	Hydraulic Modelling Results	
SW1	Fordley Road (main river)	Afflux: +0.13	Afflux: +0.13
SW2	Garden House Farm watercourse	Negligible afflux: +0.01	Negligible afflux: +0.00
SW3	Hawthorn Road watercourse	Afflux: + 0.02	Afflux: + 0.02
SW4	Theberton Hall	No change to existing culvert – not modelled	
sSW5	Pretty Road watercourse crossing	Negligible afflux: +0.01	Negligible afflux: +0.00
SW6	Theberton watercourse (main river)	Negligible afflux: -0.01	Negligible afflux: +0.01
SW7	Fish Grove Pond watercourse	Review and update will be carried out during design– not modelled	

b) Modelling limitations and assumptions

7.1.6. The hydraulic modelling used to inform this FRA was a simplified 1D modelling exercise with limited information available. As initially proposed in the methodology discussed with the Environment Agency, only one cross-section was surveyed at each watercourse at the locations of the proposed road crossings. However, no cross-section data was collected for crossings SW4 and SW5 due to site access restrictions.

7.1.7. Therefore, the modelling exercise was needed to make a variety of assumptions regarding the overall gradient of the catchment and the geometry of the channels.

7.1.8. In these cases, a manual adjustment has been made in order to improve the channel geometry and slope to provide reasonable and stable representation of the watercourses.

7.1.9. One-metre resolution LiDAR data was obtained and used to inform the hydraulic models where survey data was not available or on occasions where the data could be insufficient. This approach is normal for smaller watercourses with a channel width of less than one metre.

7.1.10. The model was run using Flood Modeller version 4.4.6. This version does not offer a three-sided culvert unit. In order to maintain the natural river bed like the portal culverts, ordinary river units were used with raised banks to represent culvert walls. Bridge units were initially considered however these do not account for any length of the structure and would not consider appropriate losses and constriction.

7.1.11. The area around the SW1 crossing includes assumptions in order to maintain a stable, positively graded model. The stated gradient within the design of the SW1 crossing being 1:60, it has instead been set to 1:100 for gradient continuity reasons.

7.1.12. This gradient change has caused the bed level of the upstream face of the crossing to be 9.2m AoD. The design specifies 8.8m AoD, which has been used as the downstream bed level.

7.1.13. There is an existing culvert upstream of the proposed connection road portal culvert at Hawthorn Road (crossing SW3), which has not been modelled. This exclusion is a conservative approach as including the culvert would potentially introduce a constriction of flow at high flow events. The current approach allows for the maximum amount of water to reach the proposed crossings culverts, thus maximising the potential impact of the development.

7.1.14. Inflow hydrographs for the models were derived using the Revitalised Flood Hydrograph Version 2.2 method as the most appropriate for this study. Catchment descriptors were obtained from the Centre for Ecology and Hydrology Flood Estimation Handbook (CEH FEH) web service[2]. The flood estimation handbook catchment areas were checked against LiDAR elevation data and amended as required. Further details on hydrological assessment are available in the modelling report provided in **Appendix A**.

7.1.15. The modelling results are presented for the design event (the 1 in 100-year event with 65% allowance for climate change) with focus on the assessment of the on-site flood risk. Whereas the assessment of the off-site impacts was based on the 1 in 100-year event with 35% allowance for climate change.

7.1.16. Model runs were also conducted for higher return periods to consider and assess the worst-case scenario and sensitivity testing.

c) Modelling results for SW2, SW5 and SW6

7.1.17. As highlighted in **Table 7.1**, modelling of crossings at SW2, SW5 and SW6 showed there were negligible changes to the water levels as a result of the

[2] https://fehweb.ceh.ac.uk/

proposed portal culverts. As the portal culvert is designed to sit on top of the banks, it does not interfere with the in-channel flows.

7.1.18. These results are shown in **Plate 7.1**, **Plate 7.2** and **Plate 7.3** which depict the in-channel maximum water levels on a cross-section view of the crossings SW2, SW5 and SW6 respectively for the 1 in 100-year event with both 35% and 65% allowances for climate change.

7.1.19. The results illustrate that watercourse crossings SW2, SW3 and SW6 show negligible affluxes over the baseline scenario. The maximum flood levels for watercourse crossings SW2 and SW5 remain in bank, whilst flood levels at SW6 occupies up to 10m of flood plain, for both events. The maximum flood levels at SW6 is shown to reduce with the culvert in place compared to the baseline during the 1 in 100 year with 35% allowance for climate change. This appears to be caused by the additional friction and roughness losses for the low depth of flow over the flood plain in the baseline scenario having more impact than the increased, but quicker flow, through the culvert. As the water depth increases and friction reduces during the 1 in 100 year with 65% climate change and the 1 in 1000-year flows, the 'with scheme' maximum water levels were no longer lower than the corresponding baseline levels.

7.1.20. **Table 7.1** presents the results for these three crossing locations for all considered return period events and climate change scenarios. Additional detail is available in the modelling report.

Table 7.2 Modelled peak water levels for crossings SW2, SW5, and SW6

Node	Return period (years)	Baseline level (m AoD)	With scheme level (m AoD)	Difference in level (m)
Upstream face of SW2 culvert (SW2_177)	1in 5	13.02	13.03	0.01
	1 in 20	13.07	13.08	0.01
	1 in 100	13.16	13.16	0.00
	1 in 100+35%CC	**13.22**	**13.23**	**0.01**
	1 in 100+65%CC	**13.28**	**13.28**	**0.00**
	1 in 1,000	13.30	13.30	0.00
Upstream face of SW5 culvert (SW5_583)	1 in 5	11.20	11.20	0.00
	1 in 20	11.22	11.23	0.01
	1 in 100	11.27	11.28	0.01
	1 in 100+35%CC	**11.31**	**11.32**	**0.01**
	1 in 100+65%CC	**11.34**	**11.35**	**0.00**

Node	Return period (years)	Baseline level (m AoD)	With scheme level (m AoD)	Difference in level (m)
	1 in 1,000	11.37	11.37	0.00
Upstream face of SW6 culvert (SW6_110)	1 in 5	11.88	11.88	0.00
	1 in 20	11.94	11.94	0.00
	1 in 100	12.06	12.04	-0.02
	1 in 100+35%CC	**12.12**	**12.11**	**-0.01**
	1 in 100+65%CC	**12.16**	**12.17**	**0.01**
	1 in 1,000	12.19	12.19	0.00

Plate 7.1. Maximum water levels at crossing SW2 for the 1 in 100-year +35%CC and +65%CC

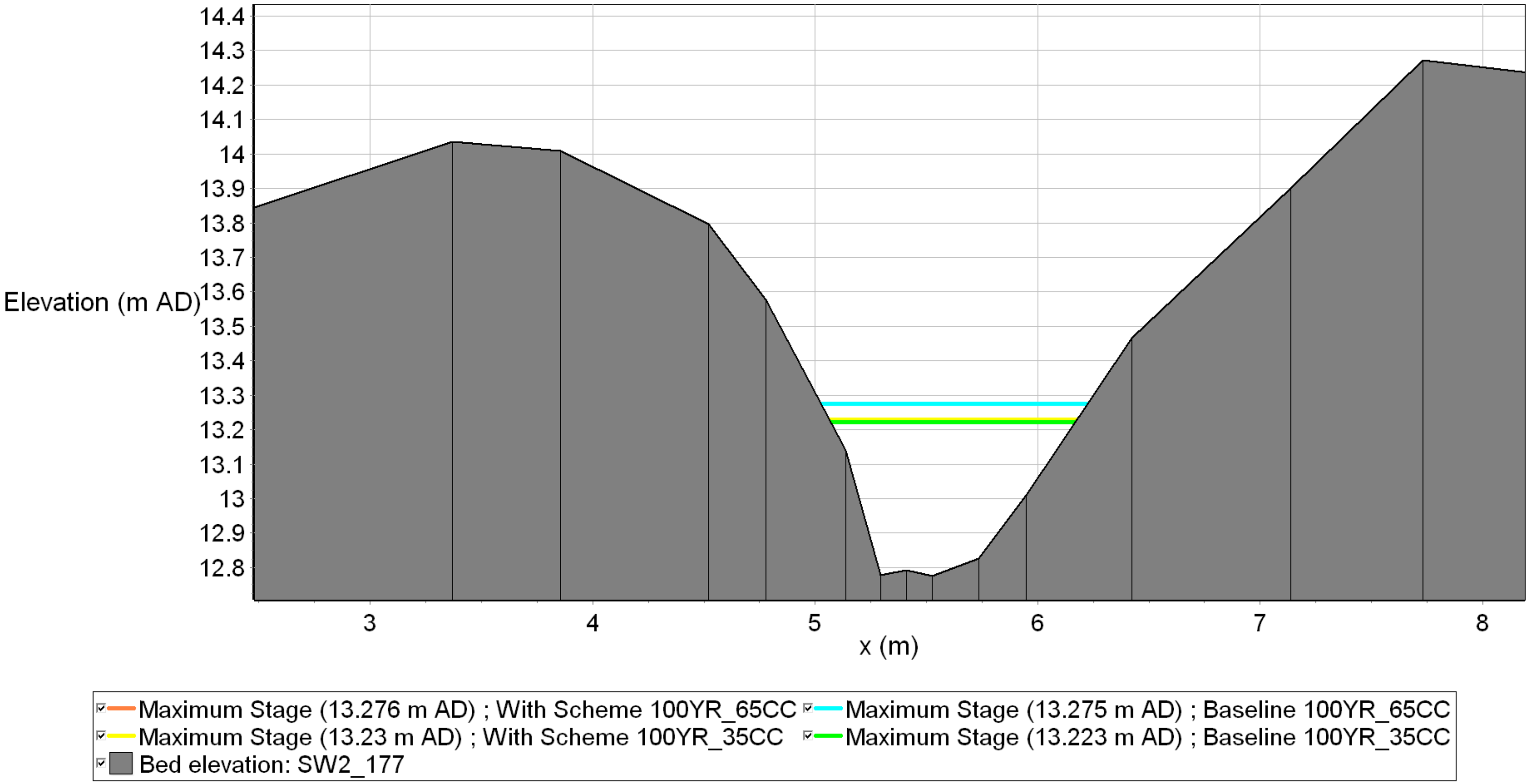


Plate 7.2. Maximum water levels for crossing SW5 for the 1 in 100-year +35%CC and +65%CC

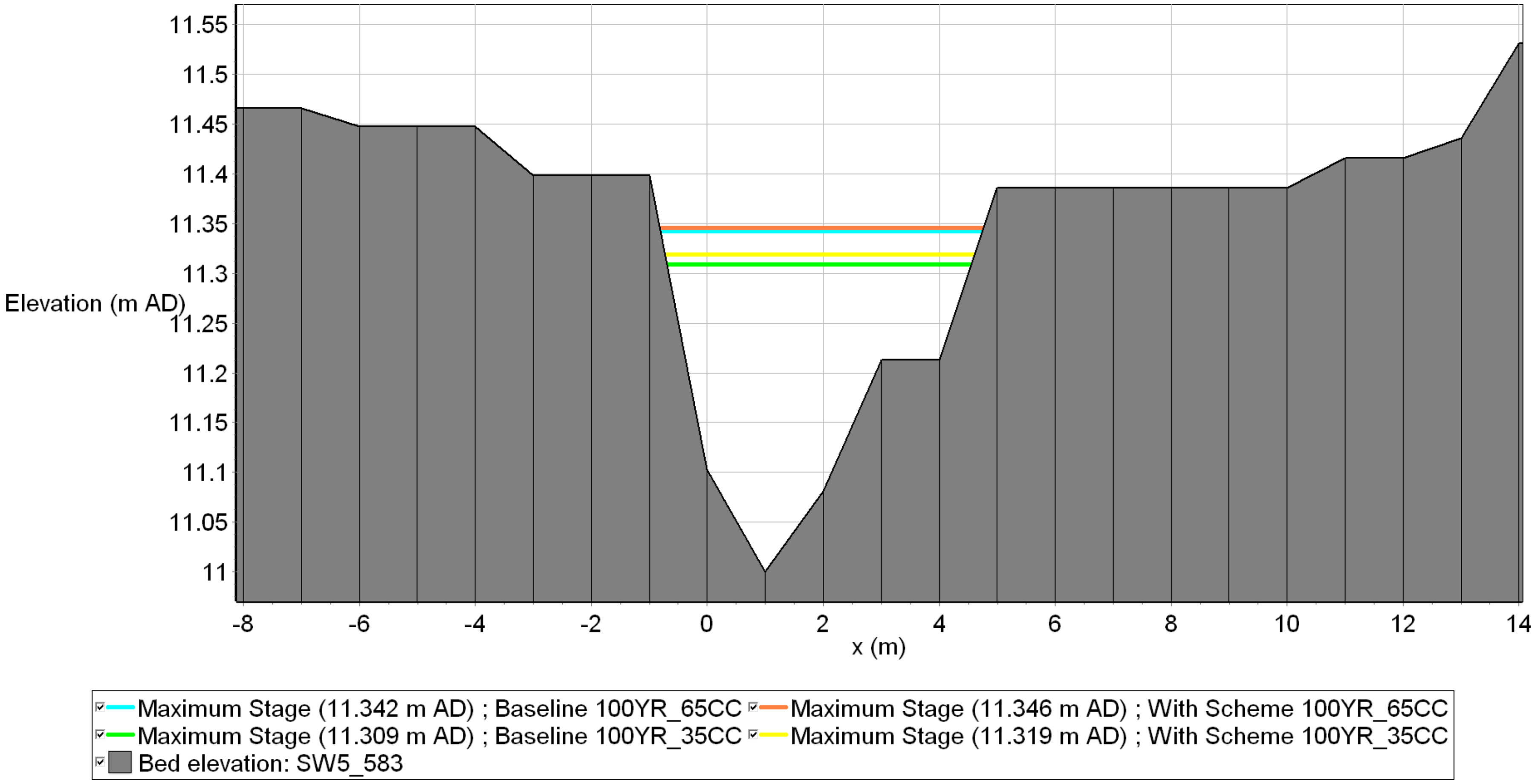
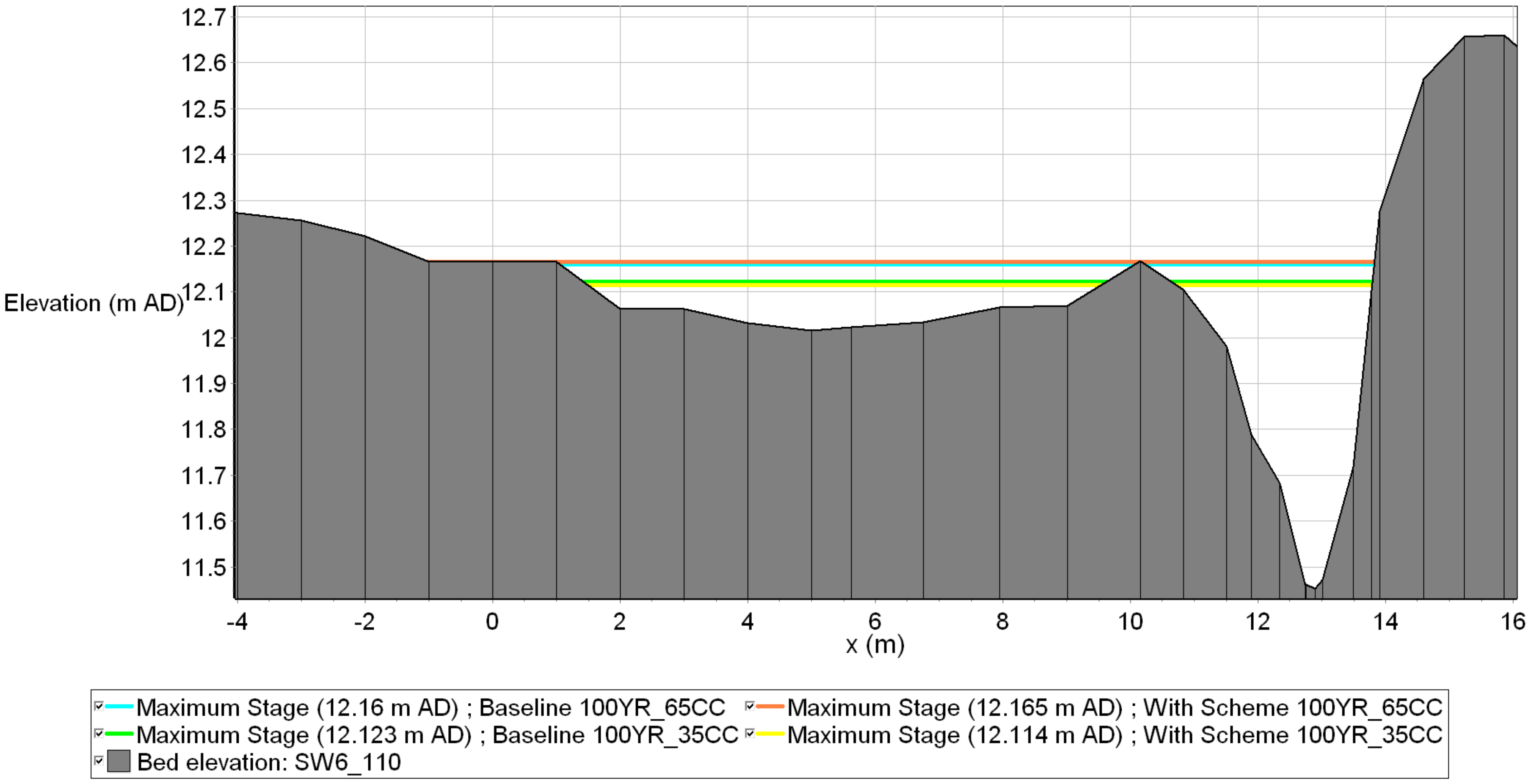


Plate 7.3. Maximum water levels for crossing SW6 for the 1 in 100-year +35%CC and +65%CC



d) Modelling results for SW1 (Fordley Road)

7.1.21. Current proposed design at the Fordley Road crossing assumes there will no longer be a connection between Fordley Road and the B1122. Instead, the south-western end of Fordley Road will connect to the proposed Sizewell link road. As a result, the proposed development will not change the flood risk to the existing B1122.

7.1.22. The catchment is a comparatively large area when compared to the other watercourses within the site boundary. At the location of the proposed junction, Fordley Road has relatively low topographic levels when compared to the ground levels to the east. The ground is close to the watercourse and floods during high flow events. In an earlier design, which comprised of two long culvert crossings under the Fordley Road and the Sizewell link road, modelling results showed restriction of flow at Fordley road. This posed a significant change in water levels upstream that would be deemed unacceptable and could potentially impact on other receptors. Consequently, the design was re-evaluated, and a revised design proposed to reduce the impact of the crossing on flood risk.

7.1.23. The current proposed design diverts the watercourse from its existing path. As a result, only the proposed link road would require a crossing to pass over the watercourse, as opposed to both the link road and Fordley Road. There is the potential for a number of alignments of the diversion channel. However, for the purposes of this model, the longest route has been modelled to enable the testing of the worst-case scenario. Changes to the design and model are discussed in detail in the modelling report.

7.1.24. As part of the watercourse realignment, the current design for SW1 would include a new engineered channel with banks sloped at a 1 in 3 gradient (**Plate 3.4**). Since the maximum available width of the portal culvert is 5.4m, the realigned channel with 1 in 3 slope banks through the culvert would not fit. Therefore, this section of the channel would have T-shaped reinforced sides with natural material lining the bed and ledges in the culvert (**Plate 3.5**).

7.1.25. In addition to the portal culvert, a flood relief culvert (2.4m x 1.0m) is included, as the maximum water levels within the culvert were initially observed to go out of bank and significantly increase water levels upstream. This flood relief culvert would be located adjacent to the portal culvert in the floodplain. The culvert would be lowered to allow passage of high flows when a certain water level is reached within the portal culvert (below the bank levels).

7.1.26. This realignment of the road means that the changes in peak water levels cannot be compared directly between the baseline and 'with scheme' model schematisations in the diverted channel extent. This is due to any change in water depths being influenced by the proposed crossings and other factors such as the channel geometry, length and gradient.

7.1.27. This can be observed in **Table 7.4**, where the node at the beginning of the diversion channel (node SW1_310) shows a difference in water level of 130mm for the design scenario (1 in 100-year with 35% climate change). This difference disappears within 60m upstream of the beginning of the diversion channel (**Plate 7.4**) and has negligible impact on the adjacent green area (mostly agricultural fields). Any impact where the peak level reaches the floodplain is restricted to within 1m additional width, and on agricultural or grass land, hence impact is negligible.

Table 7.3 Modelled water levels for crossing SW1

Node	Return period (years)	Baseline level (m AoD)	With scheme level (m AoD)	Difference in level (m)
Approx. 60m upstream of the diversion channel (SW1_378)	1in 5	11.10	11.12	0.02
	1 in 20	11.18	11.22	0.04
	1 in 100	11.33	11.36	0.03
	1 in 100+35%CC	**11.41**	**11.45**	**0.03**
	1 in 100+65%CC	**11.47**	**11.46**	**-0.02**
	1 in 1,000	11.51	11.48	-0.03
Beginning of diversion channel (SW1_310)	1in 5	10.29	10.36	0.07
	1 in 20	10.36	10.46	0.10
	1 in 100	10.49	10.61	0.12
	1 in 100+35%CC	**10.58**	**10.71**	**0.13**
	1 in 100+65%CC	**10.65**	**10.78**	**0.13**
	1 in 1,000	10.68	10.81	0.13
End of diversion channel (SW1_175)	1in 5	9.54	9.54	0.00
	1 in 20	9.64	9.64	0.00
	1 in 100	9.82	9.82	0.00
	1 in 100+35%CC	**9.89**	**9.89**	**0.00**
	1 in 100+65%CC	**9.95**	**9.95**	**0.00**
	1 in 1,000	9.98	9.98	0.00

7.1.28. The wider impact on the watercourse and adjacent area has been assessed by taking water depths from the modelling nodes upstream and downstream of the proposed watercourse diversion, where the existing channel would remain. Locations approximately 60m upstream of the diversion channel and at the end of the diversion channel were selected for the two comparison points respectively.

7.1.29. Analysis of peak water levels on the upstream node as a result of proposed crossing (**Table 7.3**) shows that a maximum afflux of 30mm at the node 60m upstream of the diversion for the 1 in 100-year event with 35% climate change and no increase in water levels for the 1 in 100-year event with 65% climate change.

Plate 7.4. Maximum water levels for crossing SW1 for the 1 in 100-year +35%CC - long-section

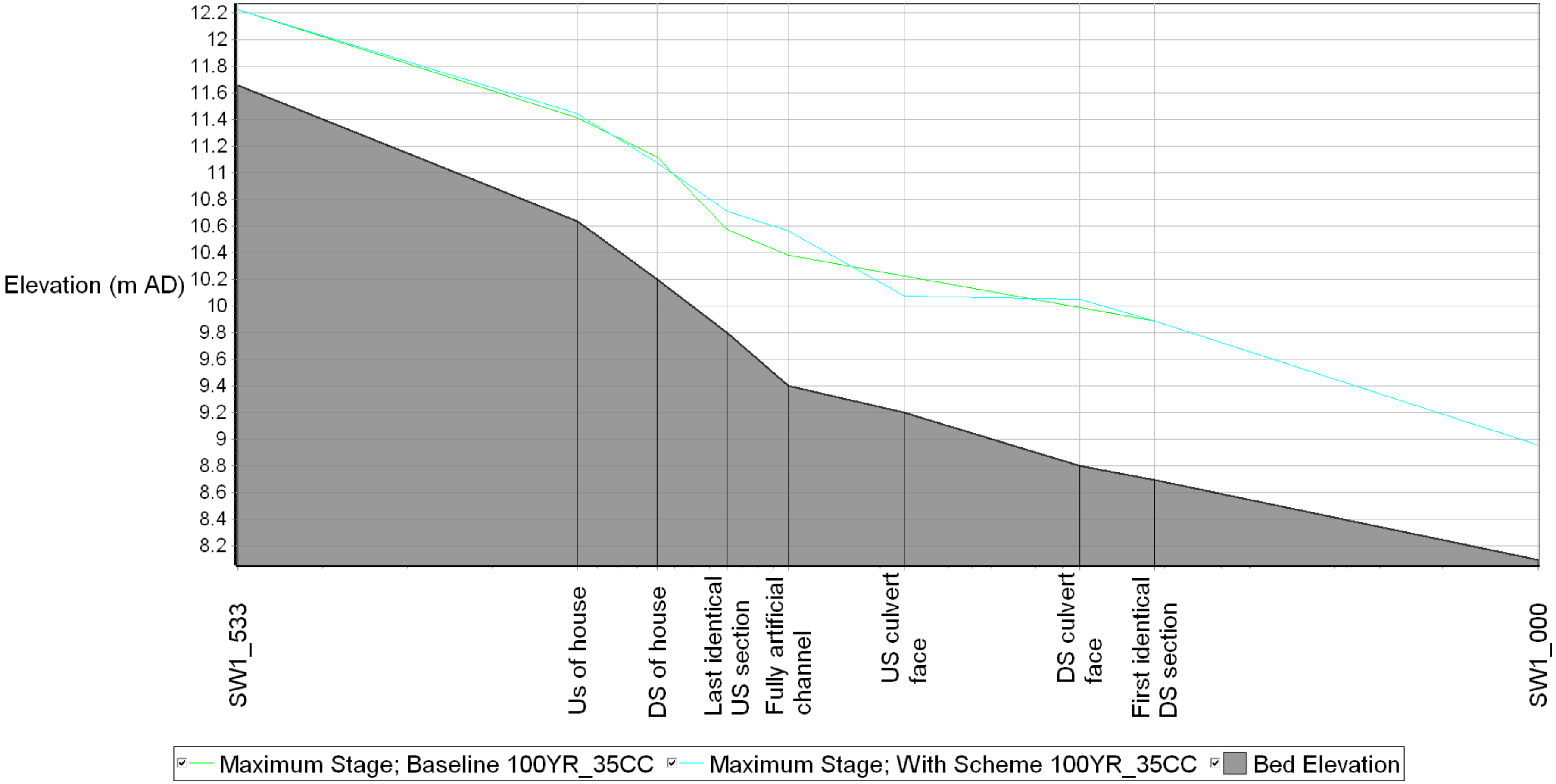


Plate 7.5. Maximum water levels for crossing SW1 for the 1 in 100-year +65%CC - long-section

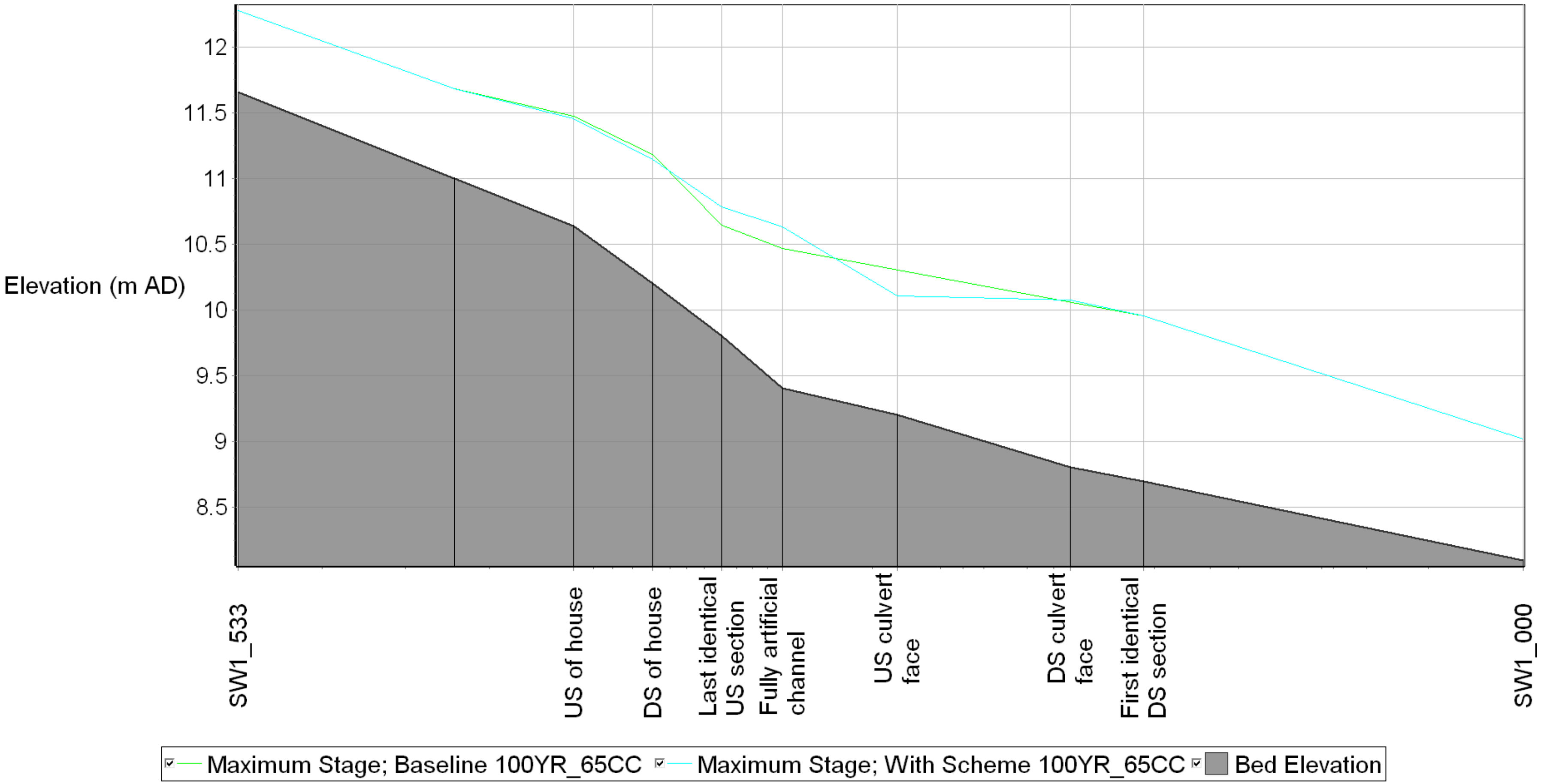


Plate 7.6. Maximum water levels for crossing SW1 for the 1 in 100-year event with 35%CC, 65%CC and 1 in 1,000-year event – cross-section at model node approx. 60m upstream of the diversion channel (SW1_378)

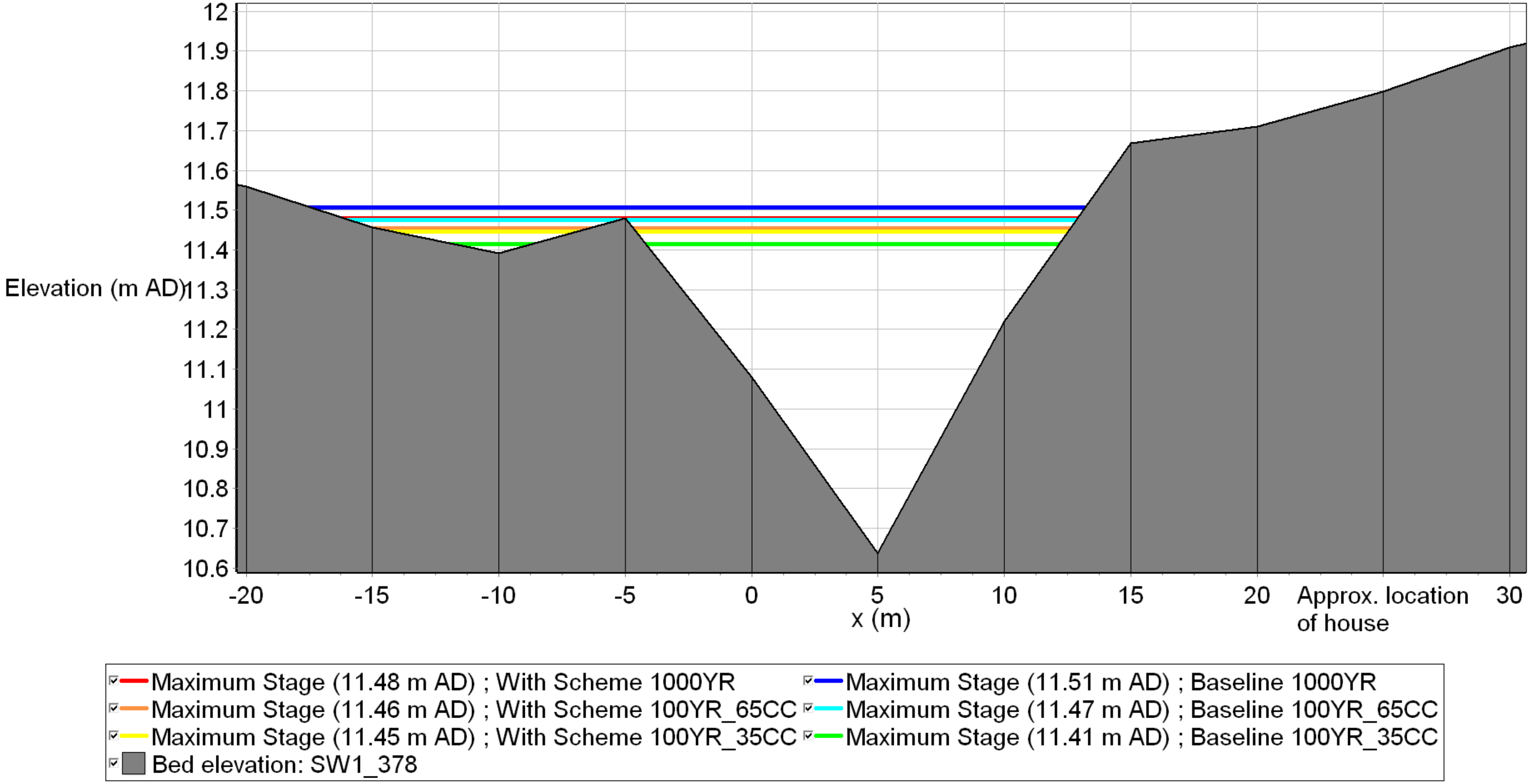
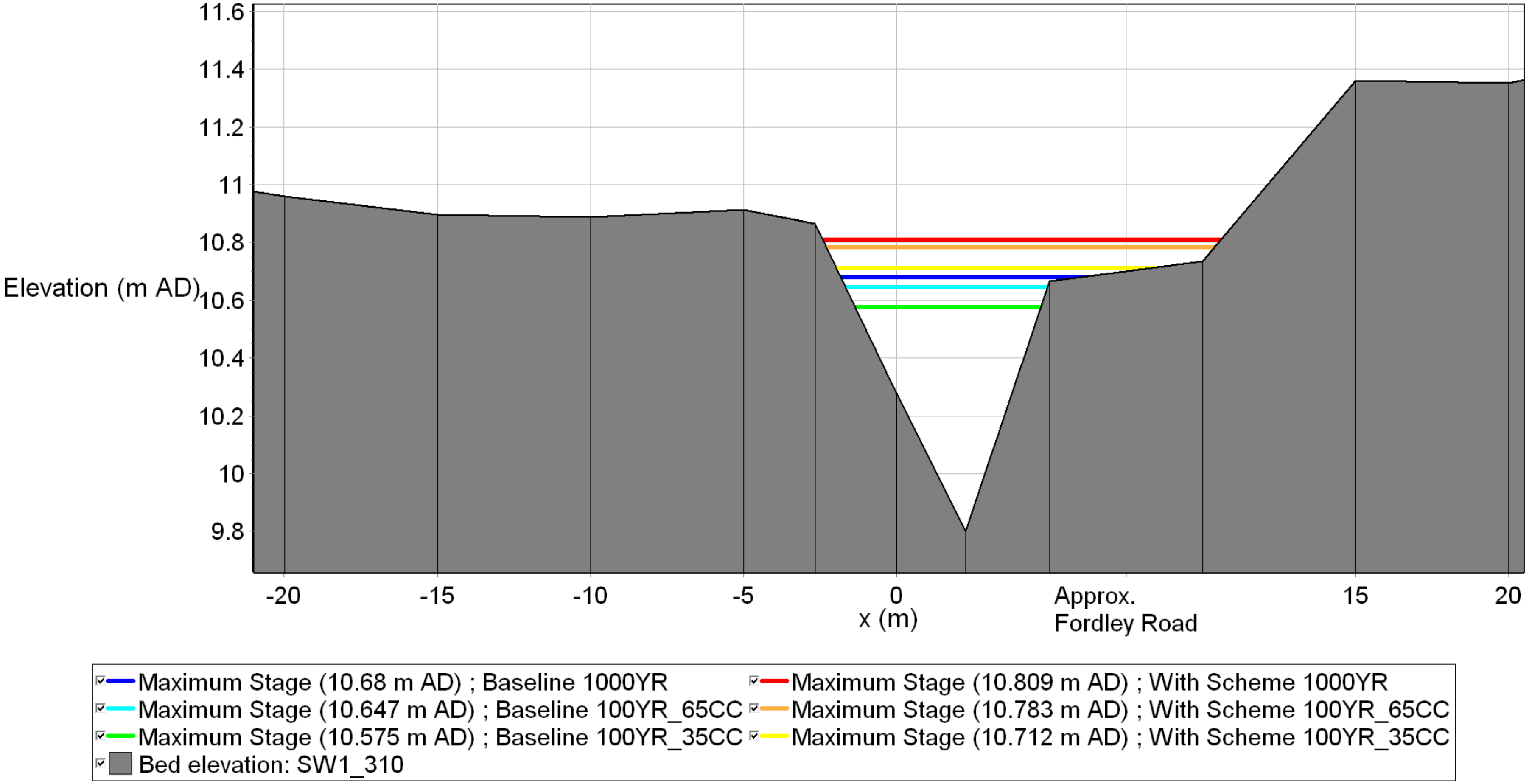


Plate 7.7. Maximum water levels for crossing SW1 for the 1 in 100-year event with 35%CC, 65%CC and 1 in 1,000-year event – cross-section at beginning of the diversion channel (SW1_310)



7.1.30. There is only one residential property in the vicinity of the proposed crossing, which is close to the node 60m upstream of the diversion channel. Analysis of satellite imagery identifies that this building is situated approximately 10m away from the watercourse on raised ground. Therefore, the property is unlikely to be affected by the peak water levels with or without development up to the 1 in 1,000-year event (**Plate 7.6**). At the downstream node, where the diverted watercourse returns to its existing channel, the modelling results show that there is no change in water levels across all return periods (**Table 7.3**). **Plate 7.5** and **Plate 7.7** show comparisons between baseline and 'with scheme results at other cross sections for SW1.

7.1.31. The long profile in the baseline has a steeper drop down to the area where the link road will be, followed by a flatter area. The raised bed level in the proposed diversion channel causes the long profile 'with scheme' to be smoother than the baseline. The differences between the 'with scheme' and the baseline at the SW1_378 (upstream of the house) node are almost entirely due to this difference in long profile. as the water surface in the baseline fluctuates more in the baseline due to more dramatic slope change. This is visible in plates 7.4 and 7.5. As a result, the water profile of the baseline crosses the profile of the 'with scheme' a couple of times before resolving itself at the node upstream of SW1_378, leading to the maximum water levels for the 'with scheme' flows being higher than those for the baseline for a short length upstream of the diversion channel.

7.1.32. The results only show limited impact on water levels immediately upstream of the diversion channel, which disappears soon afterwards, with very limited impact on the adjacent land, and no impact on buildings or residential properties. There is no impact downstream of the diverted channel. Based on the above, the impact of SW1 with the embedded design is considered to be negligible.

7.1.33. The final details on the alignment of the diversion channel would be confirmed during the detailed design and supported by updated hydraulic modelling, if required.

e) Modelling results for SW3 (Hawthorn Road)

7.1.34. The Hawthorn Road watercourse crossing (SW3) is a main river with the catchment area indicated in **Figure 4**. At this location the river would be crossed twice by the proposed development. Firstly, by the connection road from the Hawthorn Road to the Sizewell link road and then secondly by the Sizewell link road.

7.1.35. As with the Fordley Road crossing (SW1), the preliminary model runs showed an increase in water levels above acceptable threshold. Therefore, an iterative design process supported by the hydraulic modelling of various options was undertaken and led to the proposed design for these crossings.

7.1.36. The currently proposed design is for a portal culvert (5.4m wide by 1.2 high) and a flood relief box culvert (2.4m wide by 1m high) at each of the two crossings at Hawthorn Road and Sizewell link road (**Plate 3.7**). The inverts of the flood relief culverts are set at the road verge level, removing the camber, as a result. The portal culverts would be situated on top of the existing banks, not interfering with the natural channel and therefore reducing potential ecological impacts to the river bed.

7.1.37. The modelling results for all considered events (**Table 7.5**) show the portal culverts and associated flood relief culverts resulted in similar peak water levels when compared to baseline scenario. Only for a short extent between the two proposed culverts, the maximum increase in water levels is approximately 20mm (**Plate 7.11**). This increase vanishes before the Sizewell link road culvert less than 50m downstream and does not substantially change the pattern of flooding. Therefore, the proposed crossings would have a minimal local impact to the adjacent agricultural land (**Plate 7.8**, **Plate 7.9, Plate 7.10** and **Plate 7.12)**.

7.1.38. The modelled invert level of the flood relief culverts at Hawthorne road and SW3 are slightly lower than the existing road levels, due to the removal of the road camber. As a result, the 'with scheme' flood plain conveyance across the floodplain at both crossings, which are mostly confined to the road/culvert, are slightly increased compared to the baseline scenarios. The modelling results therefore show slightly reduced maximum flood levels 'with scheme' compared to the baseline immediately upstream of the proposed crossings, and conversely, slightly increased maximum flood levels 'with scheme' compared to the baseline immediately downstream of the proposed crossings.

Plate 7.8. Maximum water levels for crossing SW3 for the 1 in 100-year +35%CC - long-section

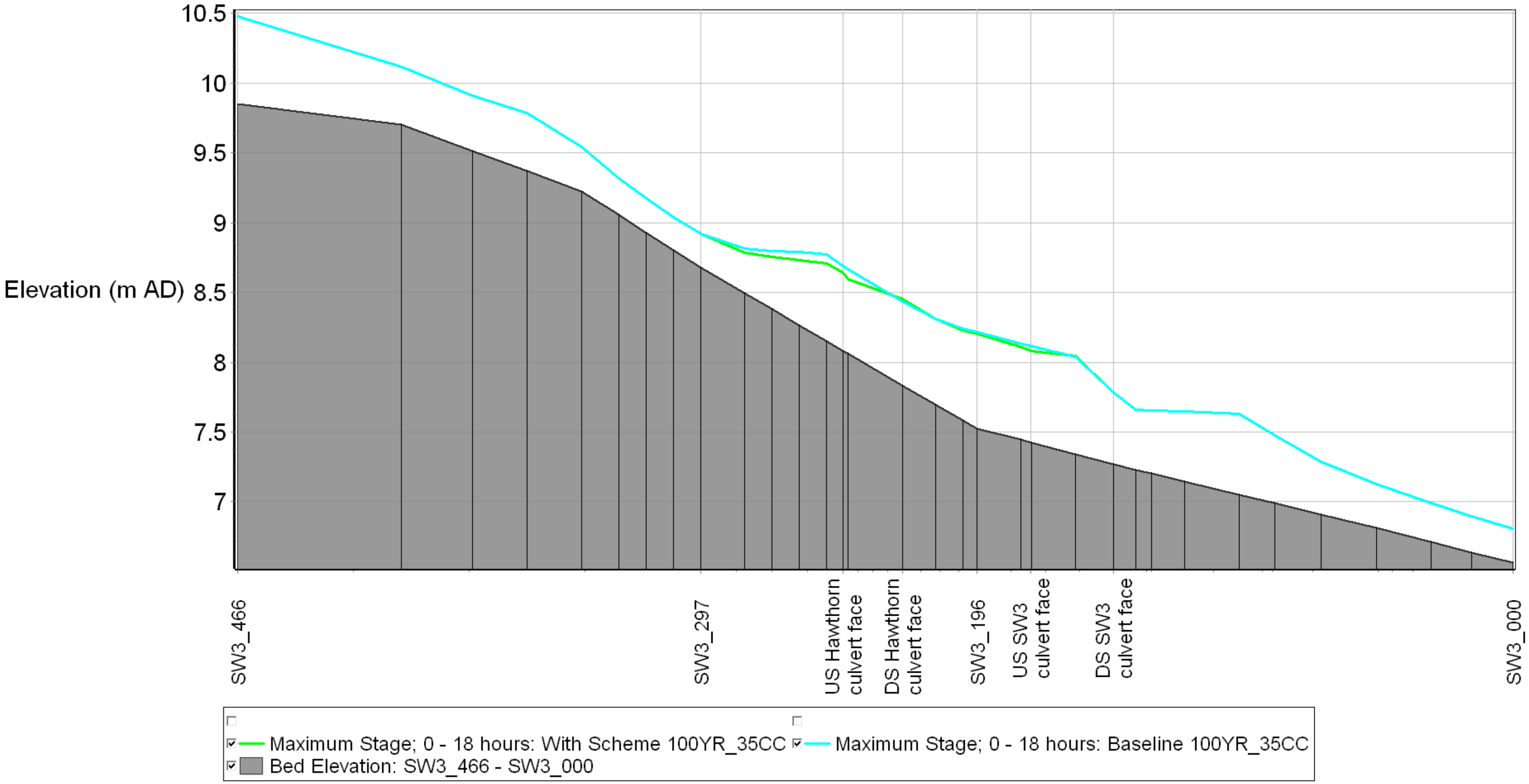


Plate 7.9. Maximum water levels for crossing SW3 for the 1 in 100-year +65%CC - long-section

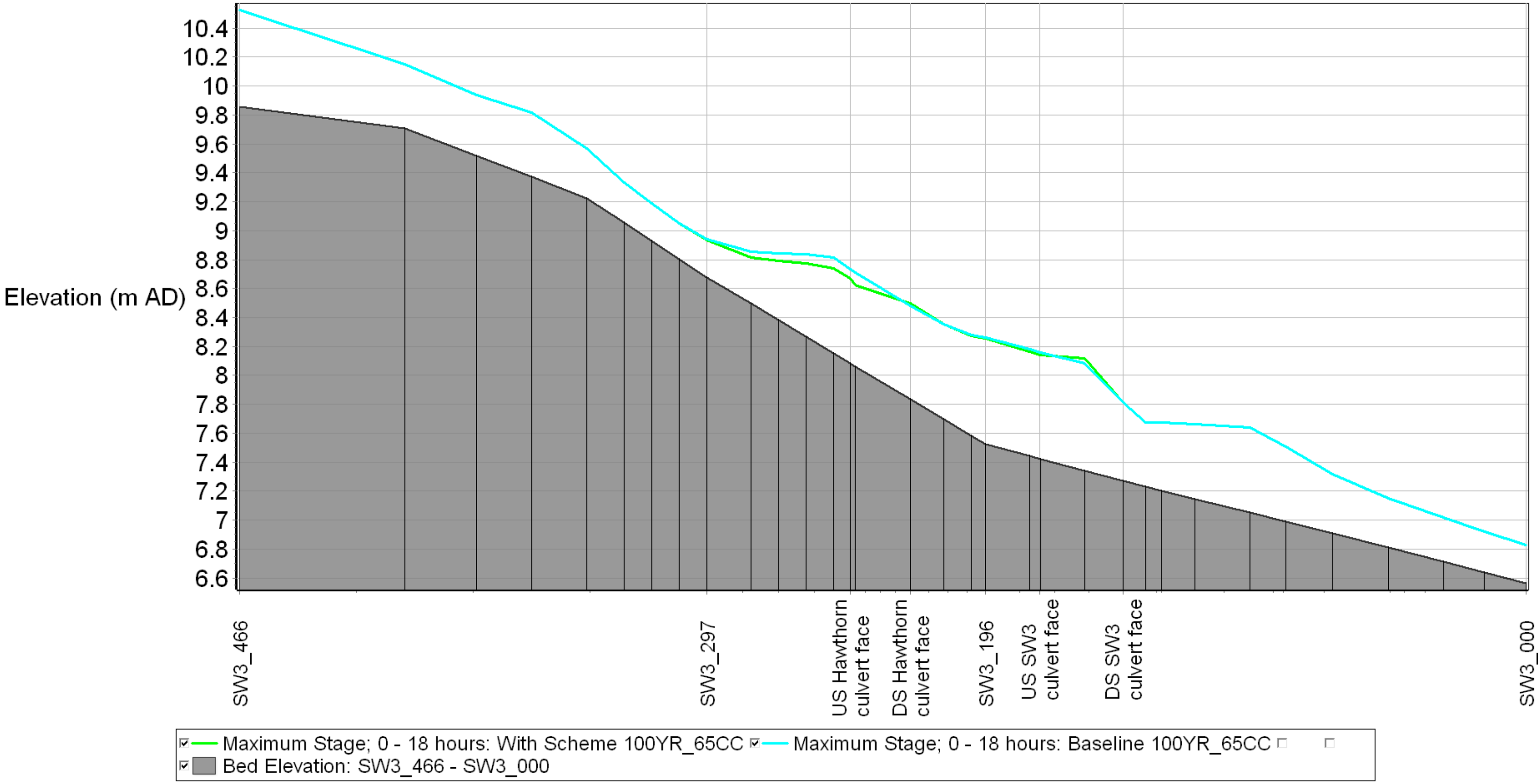


Plate 7.10. Maximum water levels for crossing SW3 for the 1 in 100-year event with 35%CC, 65%CC and 1 in 1,000-year event – cross-section at model node upstream of Hawthorn Road portal culvert (SW3_245)

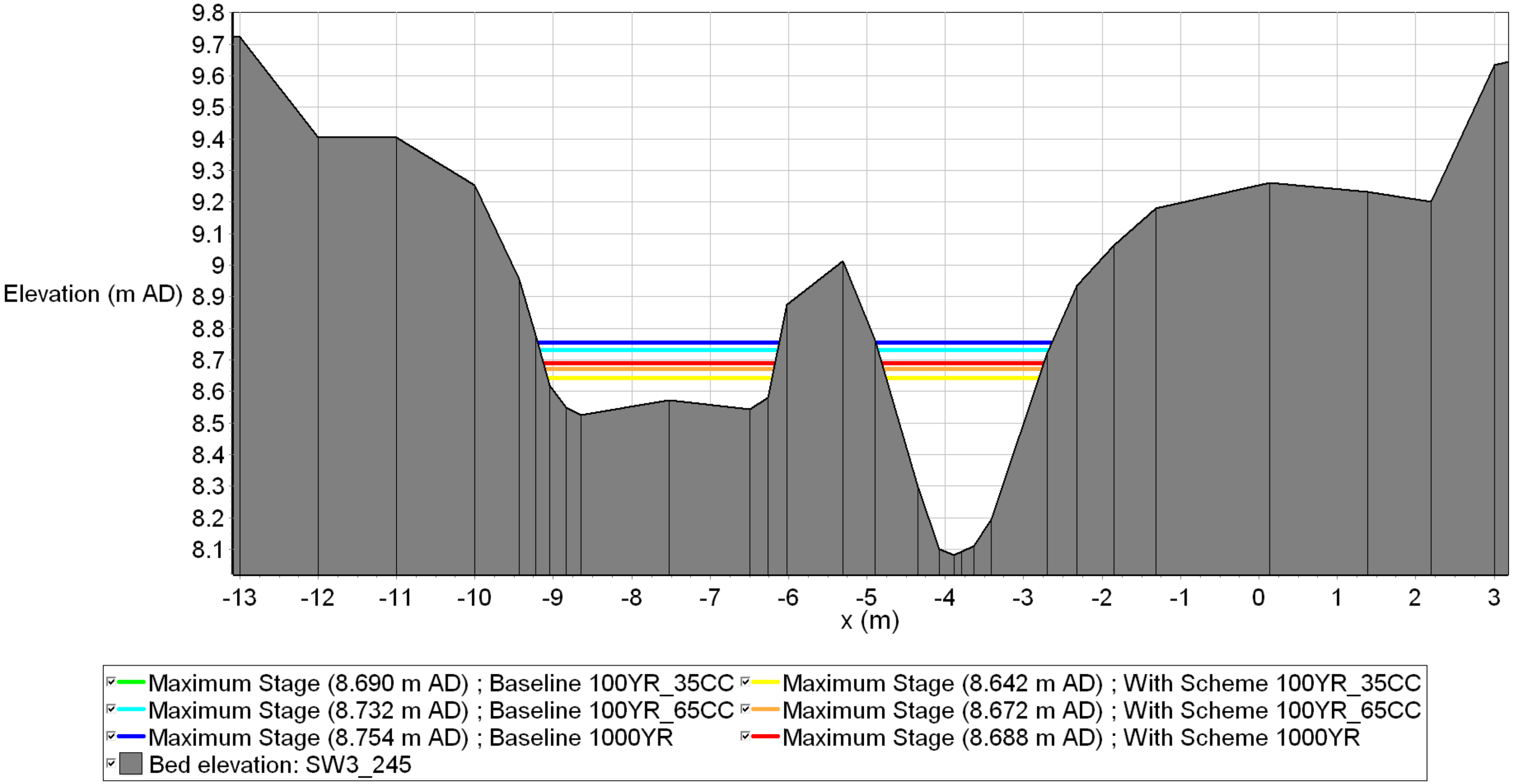


Plate 7.11. Maximum water levels for crossing SW3 for the 1 in 100-year event with 35%CC, 65%CC – cross-section at model node downstream of Hawthorn Road portal culvert (SW3_223)

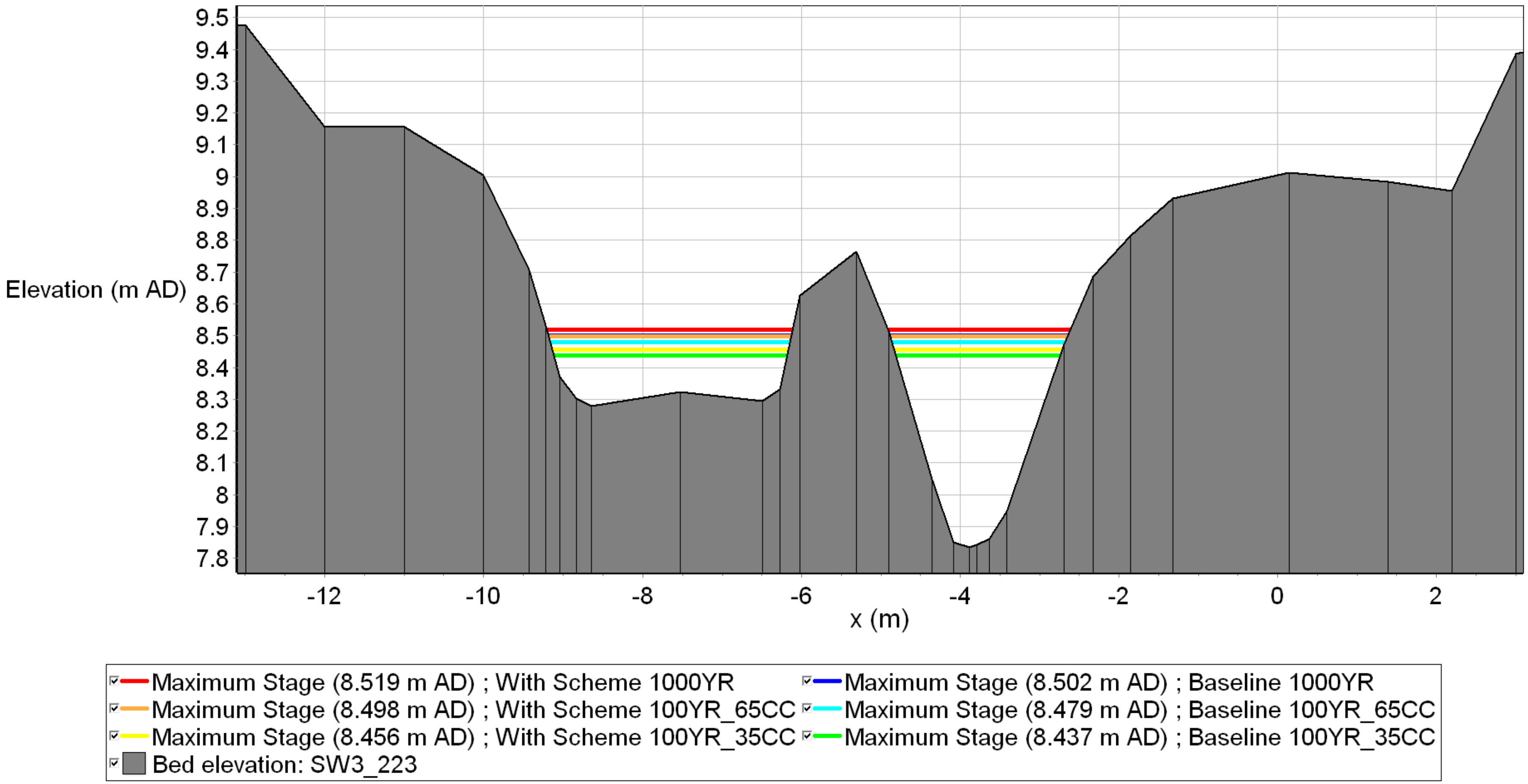


Plate 7.12. Maximum water levels for crossing SW3 for the 1 in 100-year event with 35%CC, 65%CC and 1 in 1,000-year event – cross-section at model node upstream of link road portal culvert (SW3_176)

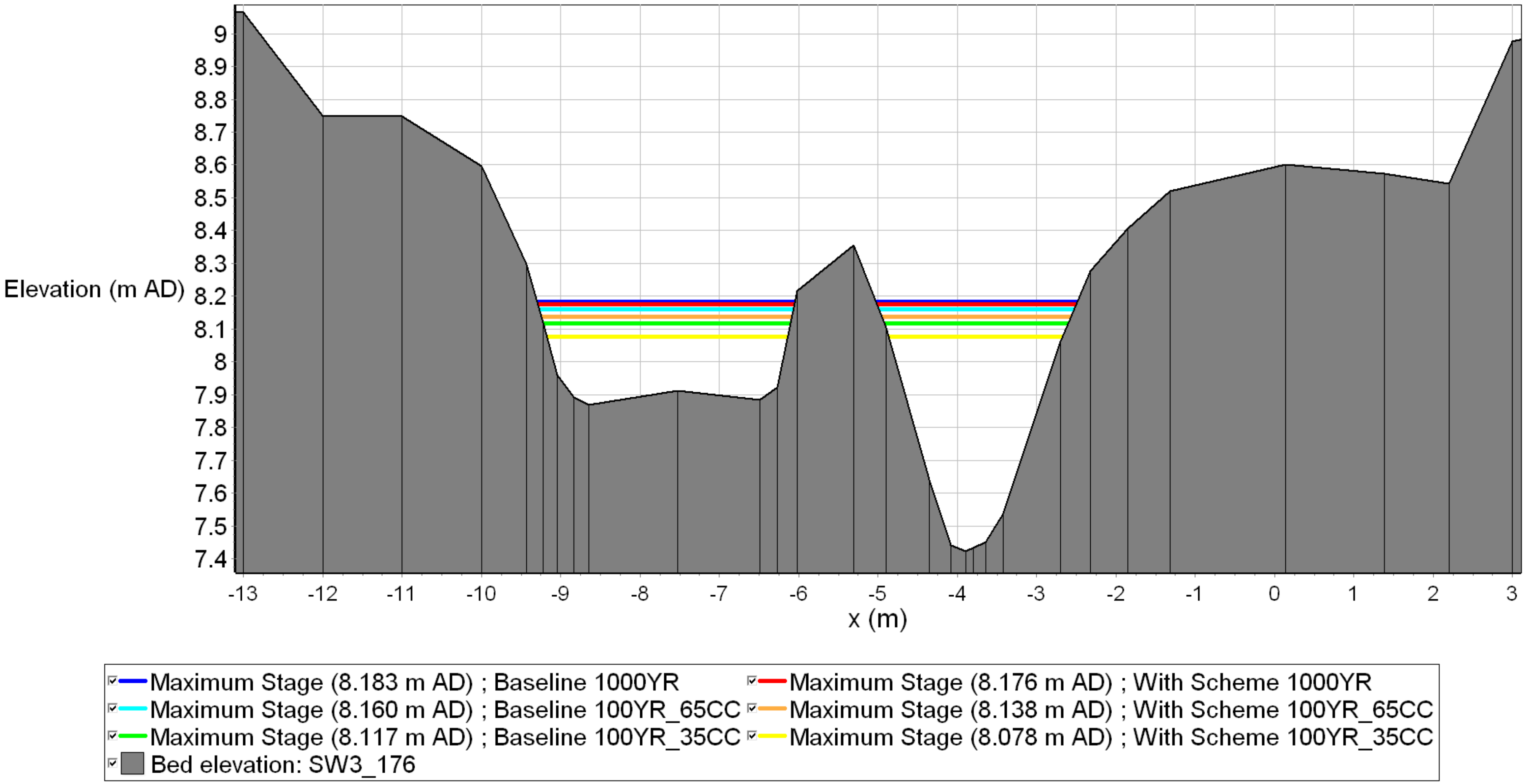
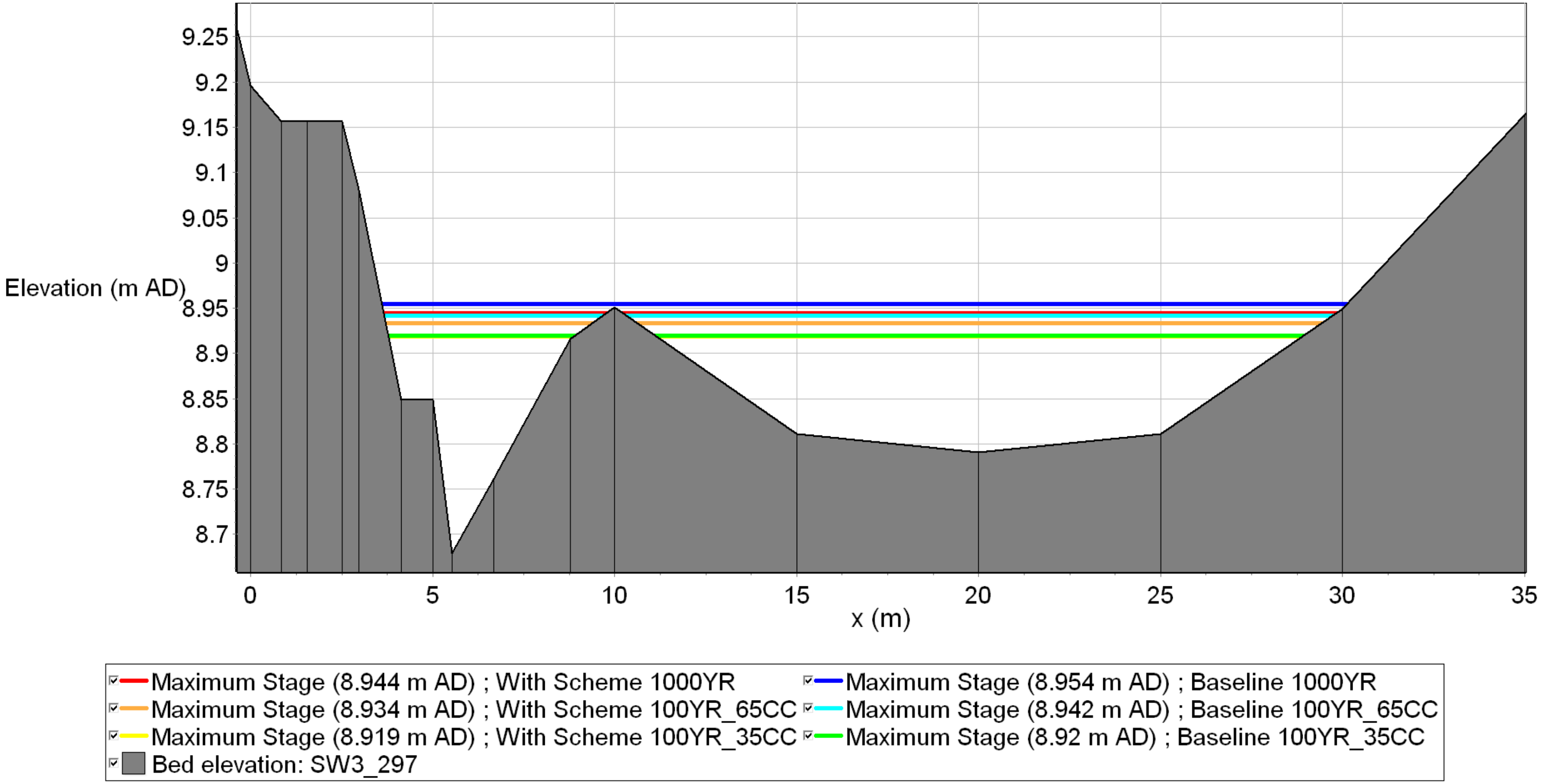


Plate 7.13. Maximum water levels for crossing SW3 for the 1 in 100-year event with 35%CC, 65%CC and 1 in 1,000-year event – cross-section at model node upstream of the crossings (SW3_297)



7.1.39. The nearest residential property is located upstream of the existing culvert. The closest model node to the property is SW3_297. The proposed development does not increase peak water levels for all the considered return period events at this location. Therefore, the scheme is considered to have no impact (**Plate 7.13)**. There are no other properties in the vicinity of the proposed crossings.

Table 7.4 Modelled water levels for crossing SW3 (Hawthorn Road)

Node	Return period (years)	Baseline level (m AoD)	With scheme level (m AoD)	Difference in level (m)
upstream of Hawthorn Road portal culvert (SW3_245)	1in 5	8.46	8.49	0.03
	1 in 20	8.55	8.54	-0.01
	1 in 100	8.64	8.60	-0.04
	1 in 100+35%CC	**8.69**	**8.64**	**-0.05**
	1 in 100+65%CC	**8.73**	**8.67**	**-0.06**
	1 in 1,000	8.75	8.69	-0.07
downstream Hawthorn Road portal culvert (SW3_223)	1in 5	8.22	8.23	0.01
	1 in 20	8.30	8.32	0.02
	1 in 100	8.39	8.41	0.02
	1 in 100+35%CC	**8.44**	**8.46**	**0.02**
	1 in 100+65%CC	**8.48**	**8.5**	**0.02**
	1 in 1,000	8.50	8.52	0.02
upstream of link road portal culvert (SW3_176)	1in 5	7.90	7.89	-0.01
	1 in 20	7.96	7.94	-0.02
	1 in 100	8.06	8.02	-0.04
	1 in 100+35%CC	**8.12**	**8.08**	**-0.04**
	1 in 100+65%CC	**8.16**	**8.14**	**-0.02**
	1 in 1,000	8.18	8.18	-0.01
downstream of link road portal culvert (SW3_146)	1in 5	7.57	7.56	-0.01
	1 in 20	7.62	7.63	0.01
	1 in 100	7.73	7.76	0.03
	1 in	**7.79**	**7.79**	**0.00**

Node	Return period (years)	Baseline level (m AoD)	With scheme level (m AoD)	Difference in level (m)
	100+35%CC			
	1 in 100+65%CC	**7.82**	**7.82**	**0.00**
	1 in 1,000	7.83	7.83	0.00

7.1.40. The modelling for the Hawthorn Road crossing has not included the existing culvert that is upstream of the proposed road crossing. In the model, it is assumed that all flow would arrive at the portal culvert. However, it is likely the existing culvert would introduce some constriction of flow further upstream. Therefore, the model has adopted a more conservative approach and the presented results are likely to slightly overestimate the water levels.

7.1.41. The results presented from the conservative model show no increase in water levels for most of the watercourse extent and very local afflux that result in negligible impacts. Therefore, it is considered the impact of the proposed Hawthorn Road crossings with the embedded design is low.

f) Modelling results sensitivity testing

7.1.42. Since the modelling was based on very limited information available at the time of the assessment, a series of sensitivity tests was carried out to determine potential impact on the model results of the following:

- a 20% increase in fluvial flows;
- a 20% increase in roughness; and
- suitability of LiDAR data in representing channel geometry and floodplain levels for the small watercourses.

7.1.43. The increase in fluvial flow test was carried out for all considered return periods, while the increased roughness test and LiDAR geometry test was carried out for the 1 in 100-year event with 35% climate change only.

7.1.44. The uplift in fluvial flow resulted in minor changes to the water levels as a result of the proposed development, in order of 48mm and 68mm for the 1 in 100-year event with 65% allowance for climate change at crossing SW1 and SW3 respectively. Although overall peak levels increased at crossings SW2, SW5, and SW6, the water levels remained within the respective watercourse channels, as illustrated in **Plate 7.15**, **Plate 7.17** and **Plate 7.18** respectively.

7.1.45. The additional flows did induce slight change in floodplain inundation for crossings SW1 (**Plate 7.14**) and SW3 (**Plate 7.16**) although this did not result in any impacts on any properties. However, the relative difference between the baseline and 'with scheme' scenarios has reduced.

7.1.46. The results also show that the relative impact of the development on maximum water levels is reduced for scenarios with higher flows.

Plate 7.14. Comparison of peak water levels at crossing SW1 (node SW1_378) – sensitivity test: +20% in flow

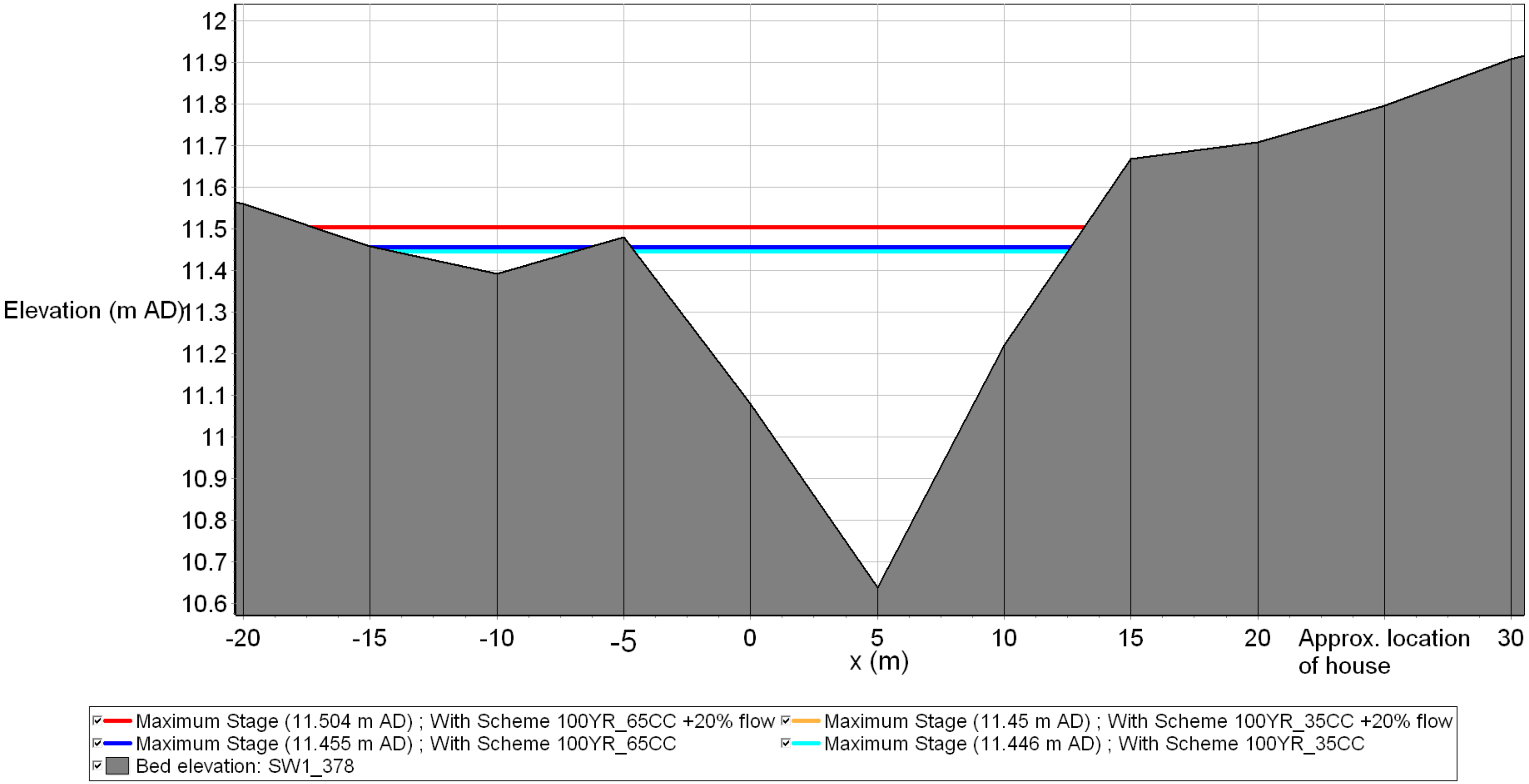


Plate 7.15. Comparison of peak water levels at crossing SW2 (node SW2_177) – sensitivity test: +20% in flow

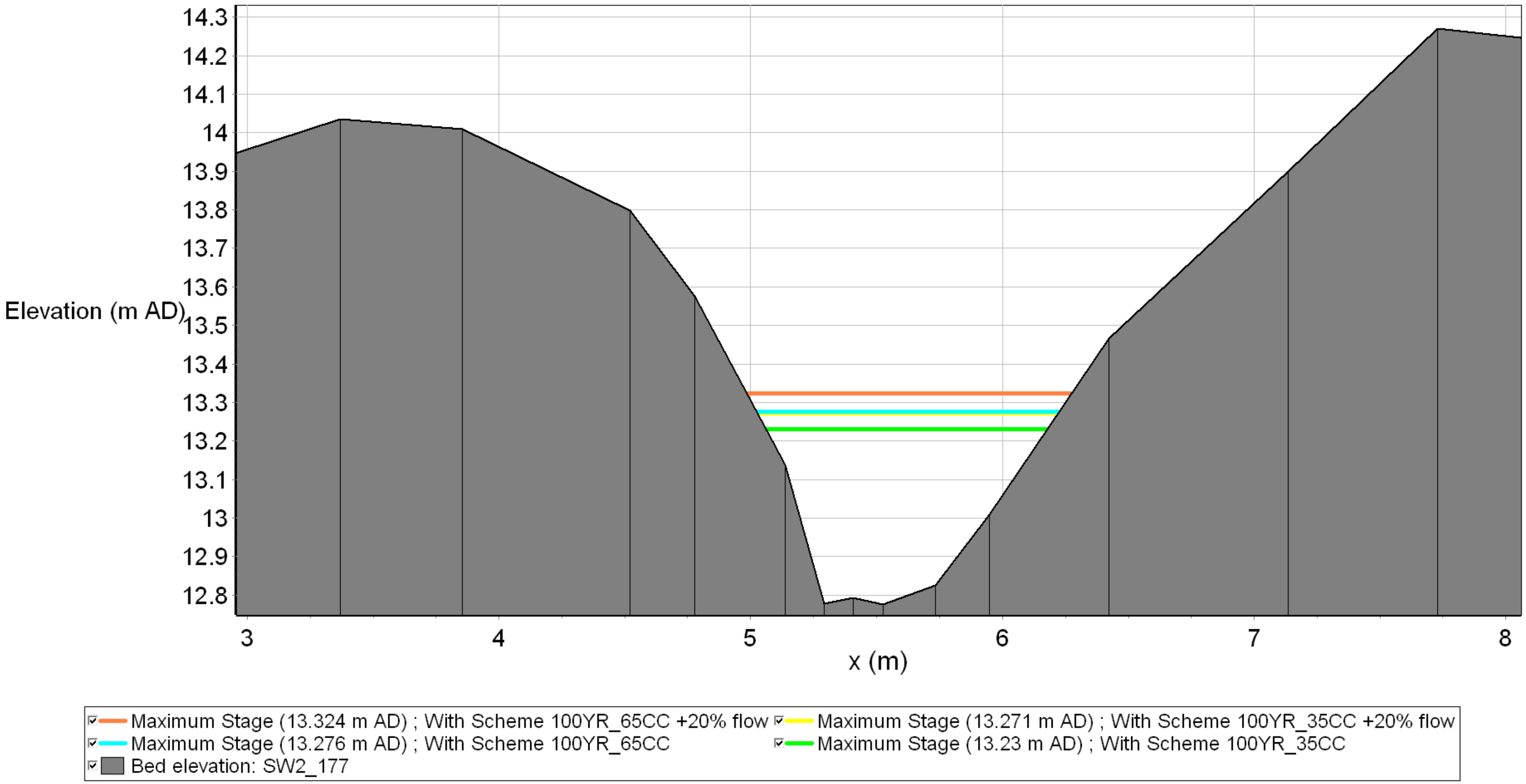


Plate 7.16. Comparison of peak water levels at crossing SW3 (node SW3_176) – sensitivity test: +20% in flow

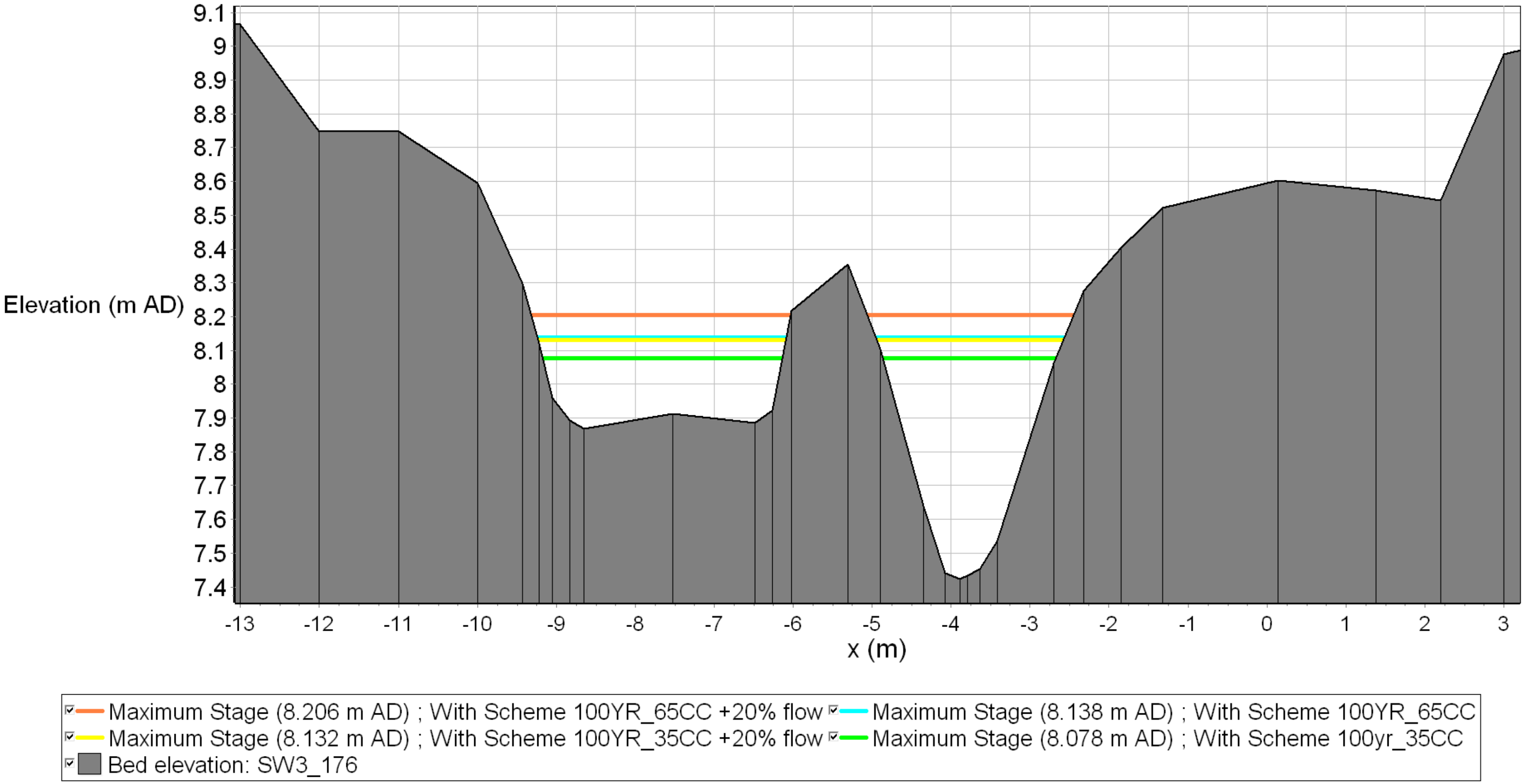


Plate 7.17. Comparison of peak water levels at crossing SW5 (node SW5_583) – sensitivity test: +20% in flow

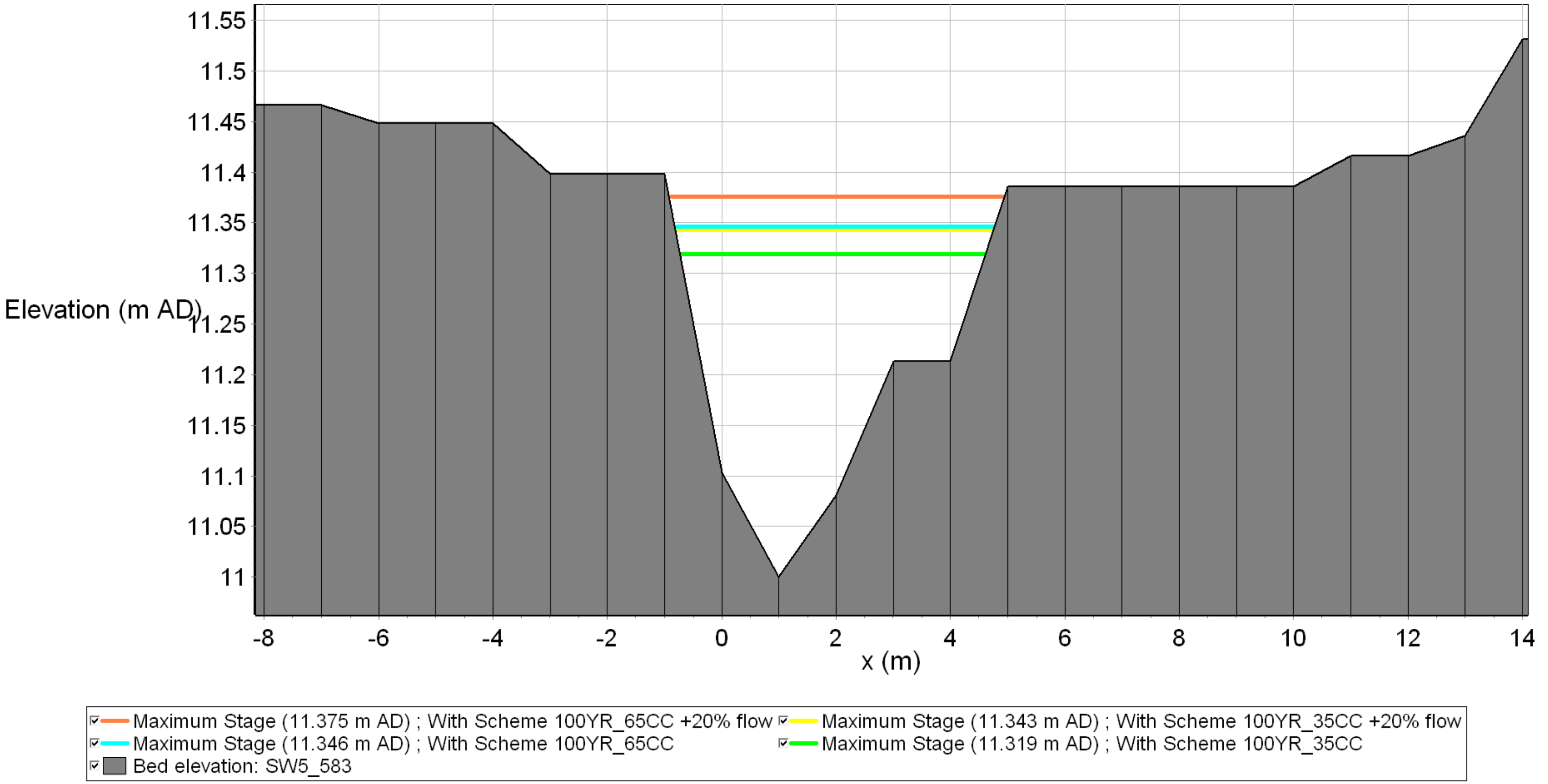
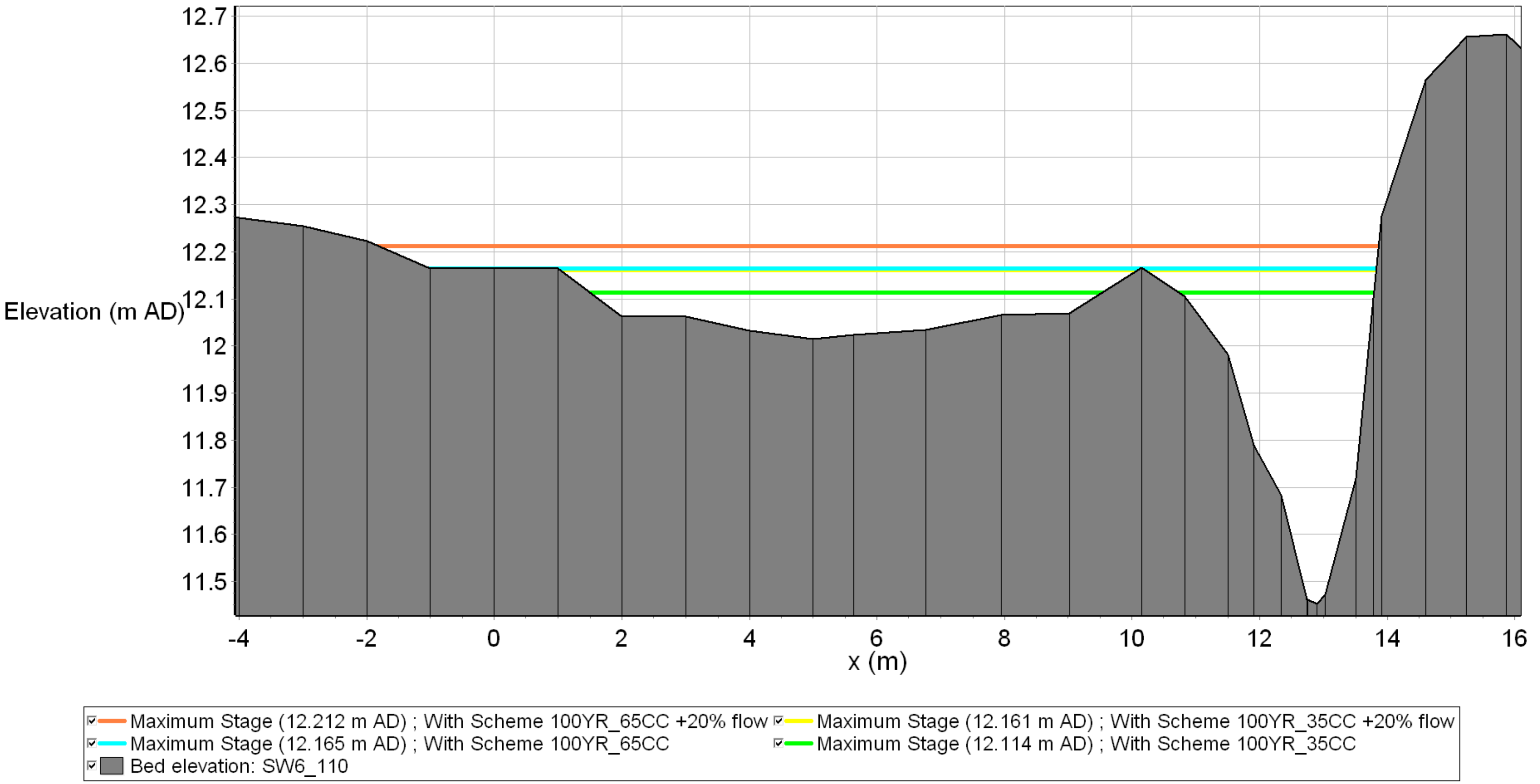


Plate 7.18. Comparison of peak water levels at crossing SW6 (node SW6_110) – sensitivity test: +20% in flow



7.1.47. The sensitivity test with increased roughness coefficients was run only for the SW1 crossing, as the preliminary model results indicated the greatest potential for negative impacts at this reach. The peak water levels increased by approximately 0.05m along the long sectional profile due to the increased roughness (**Plate 7.21**). The increase in the peak water levels is minor and does not result in any flood risk impacts to either the proposed development or to any off-site receptors. The increased water level does result in a minor increase in the floodplain flood extent by approximately 1m (**Plate 7.22**).

7.1.48. The results from the increase in roughness sensitivity test were similar to the results of the increased flow test.

7.1.49. A third sensitivity test was carried out on channel geometry. The LiDAR dataset was used to inform cross-sections upstream and downstream of the proposed crossings where no survey data was available. The LiDAR cross-sections were also extracted at the crossings to compare with the site-specific survey data. There was a variable level of alignment with the channel capacity and bed levels.

7.1.50. The highest difference was observed at SW2, where the surveyed bed level was approximately 1m lower than that from the LiDAR. This is potentially due to SW2 being one of the narrowest watercourses, hence difficult for 1m LiDAR to distinguish the bed level (**Plate 7.20**). Due to SW1 being the crossing with largest impact, this was also tested. The difference in bed level of about 0.6m was observed at crossing SW1 (**Plate 7.19**).

7.1.51. Sensitivity testing was conducted by lowering the channel in the cross-sections derived from LiDAR in line with the difference between surveyed and LiDAR sections, without changing the bank levels or overall gradient of the watercourse.

7.1.52. Results of this testing showed that for crossing SW1, the maximum water levels in the channel upstream of the crossing decreased by an average of 0.06m (**Plate 7.23** and **Plate 7.24**). These results were confirmed by performing a similar appropriate reduction to the reach at crossing SW2 (**Plate 7.25** and **Plate 7.26**). The water levels at crossing SW1 decreased by a similar amount to SW2 even though the crossing at SW1 has a larger channel, where a reduction in bed represents a larger increase in in-channel storage. There are particular reaches within the reach upstream of SW2 where larger variation in slope and impact on conveyance and hydraulic gradient leads to the 'with scheme maximum levels from the modelling results being lower than the baseline.

7.1.53. Overall, the channel geometry sensitivity testing shows that the modelled approach resulted in more conservative maximum water levels and is appropriate for this assessment.

7.1.54. Further details on the sensitivity tests and derived results are provided in the modelling report.

Plate 7.19. Comparison between LiDAR and Survey (SW1)

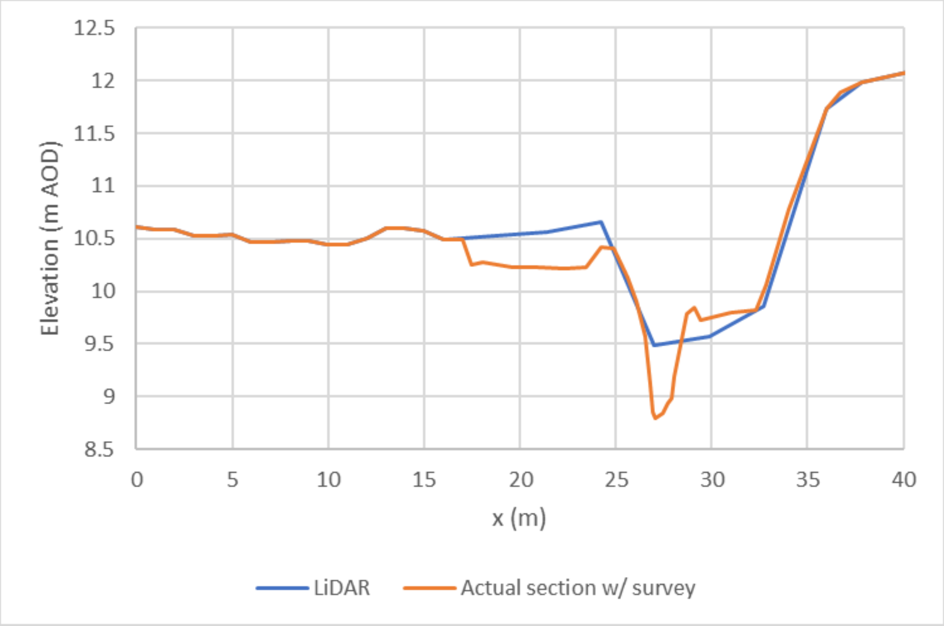


Plate 7.20. Comparison between LiDAR and Survey (SW2)

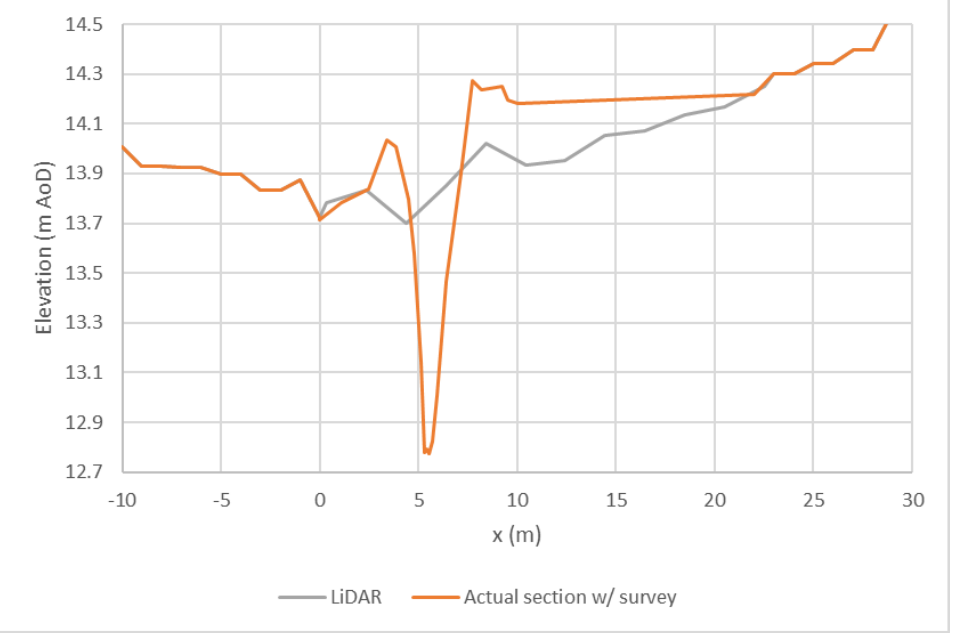


Plate 7.21. Comparison of peak water levels at crossing SW1 (long-section) – sensitivity test: +20% in roughness

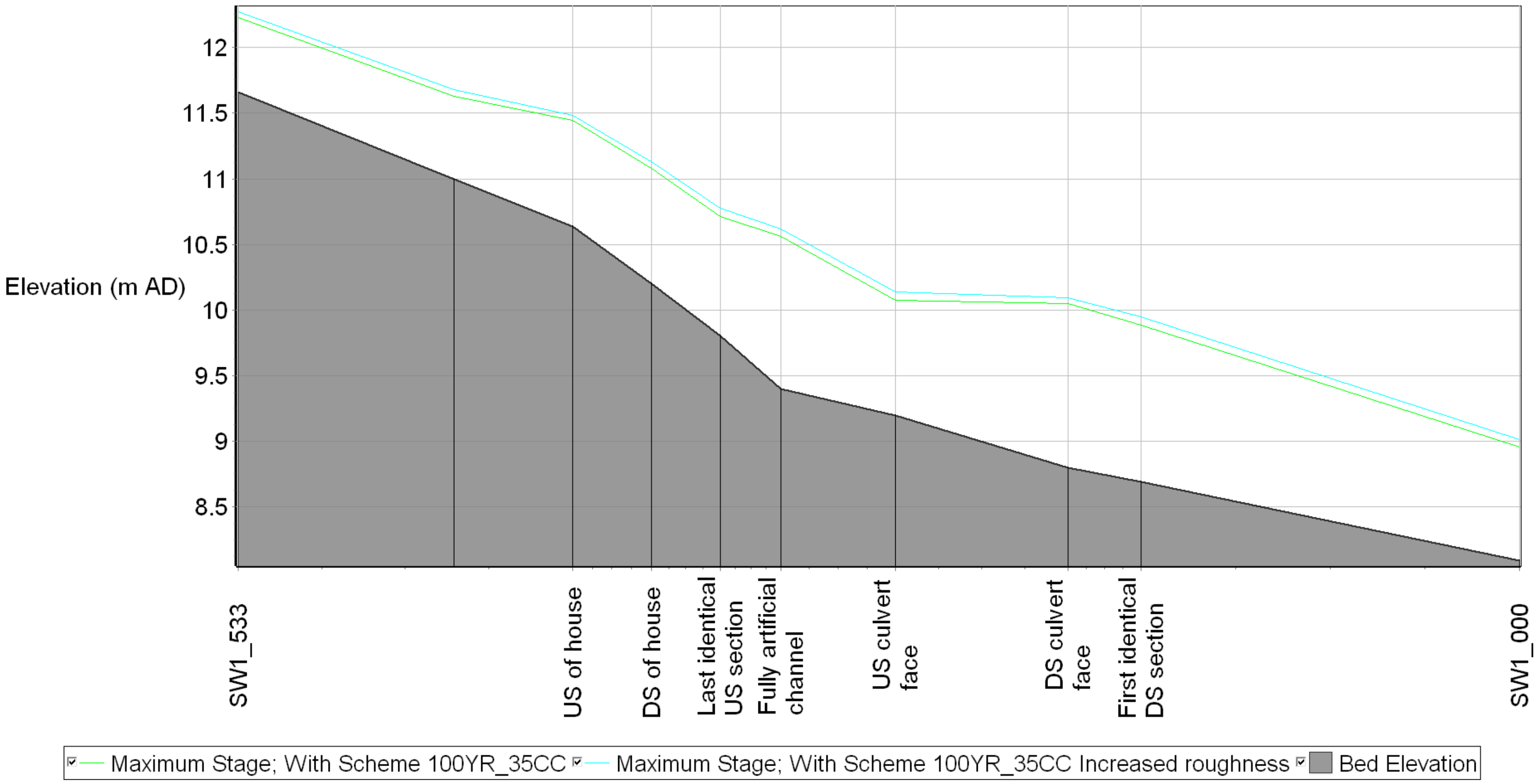


Plate 7.22. Comparison of peak water levels at crossing SW1 (node SW1_378) – sensitivity test: +20% in roughness

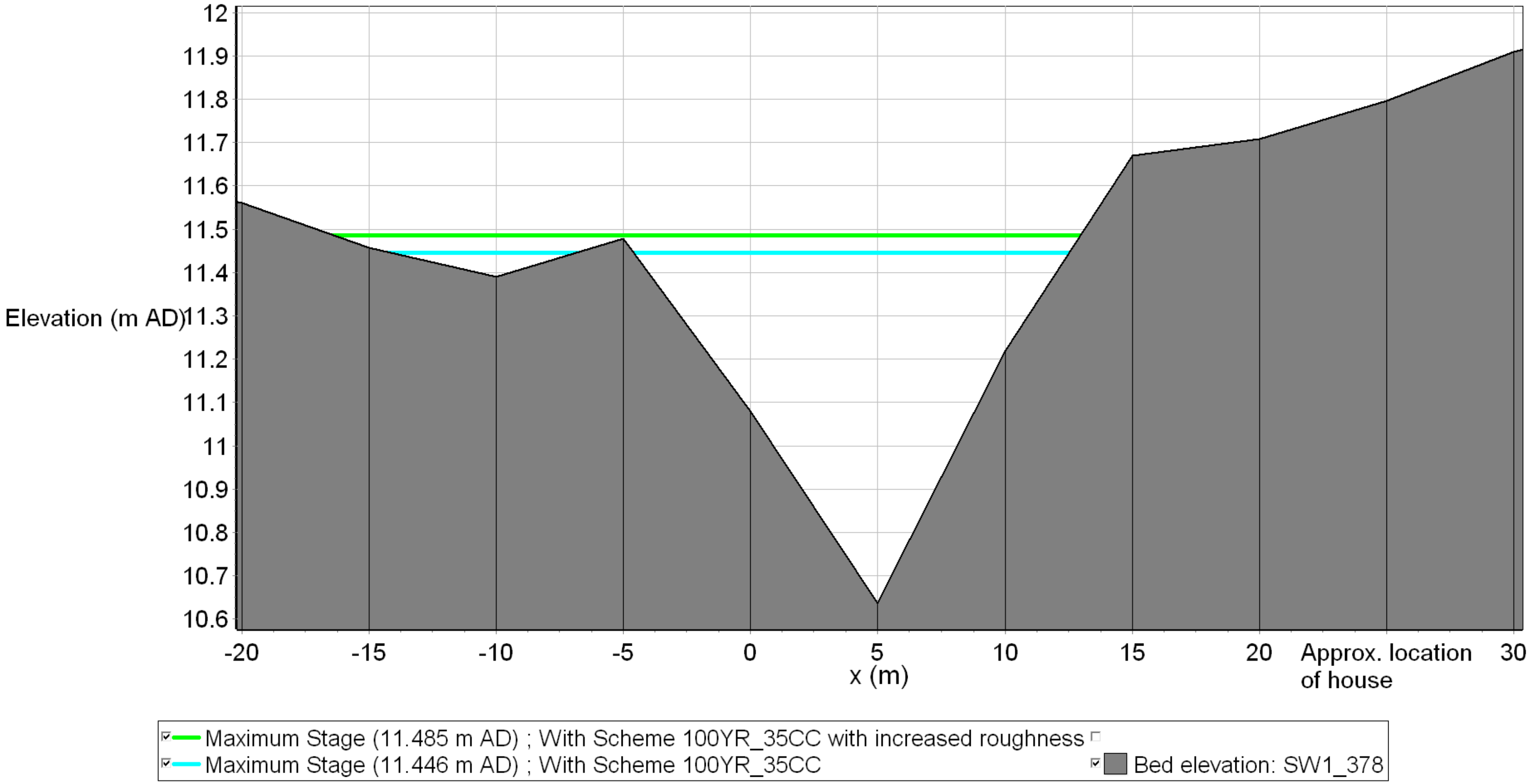


Plate 7.23. Comparison of peak water levels at crossing SW1 (node SW1_378) – sensitivity test: channel geometry

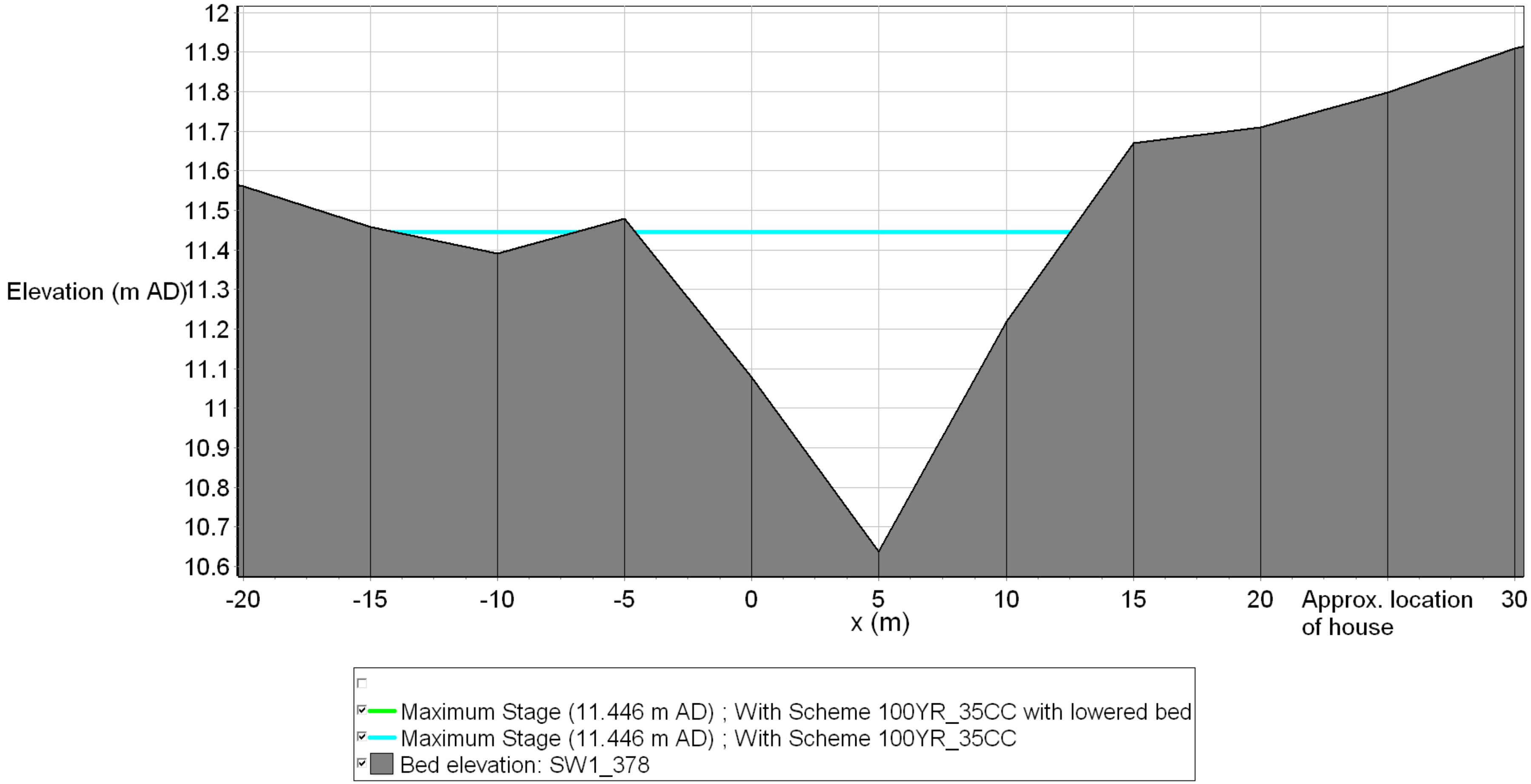


Plate 7.24. Comparison of peak water levels at crossing SW1 (long-section) – sensitivity test: channel geometry

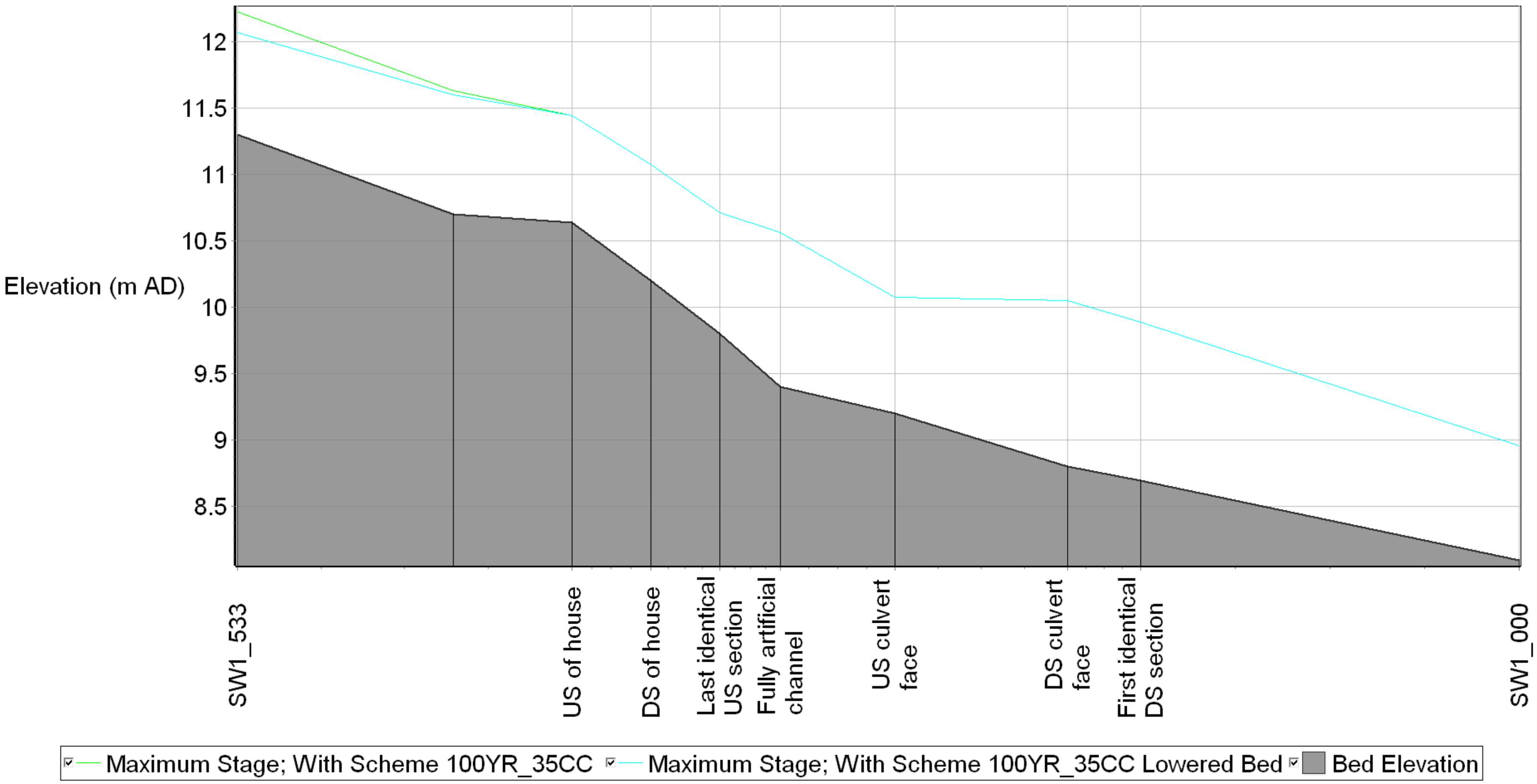


Plate 7.25. Comparison of peak water levels at crossing SW2 (node SW2_177) – sensitivity test: channel geometry

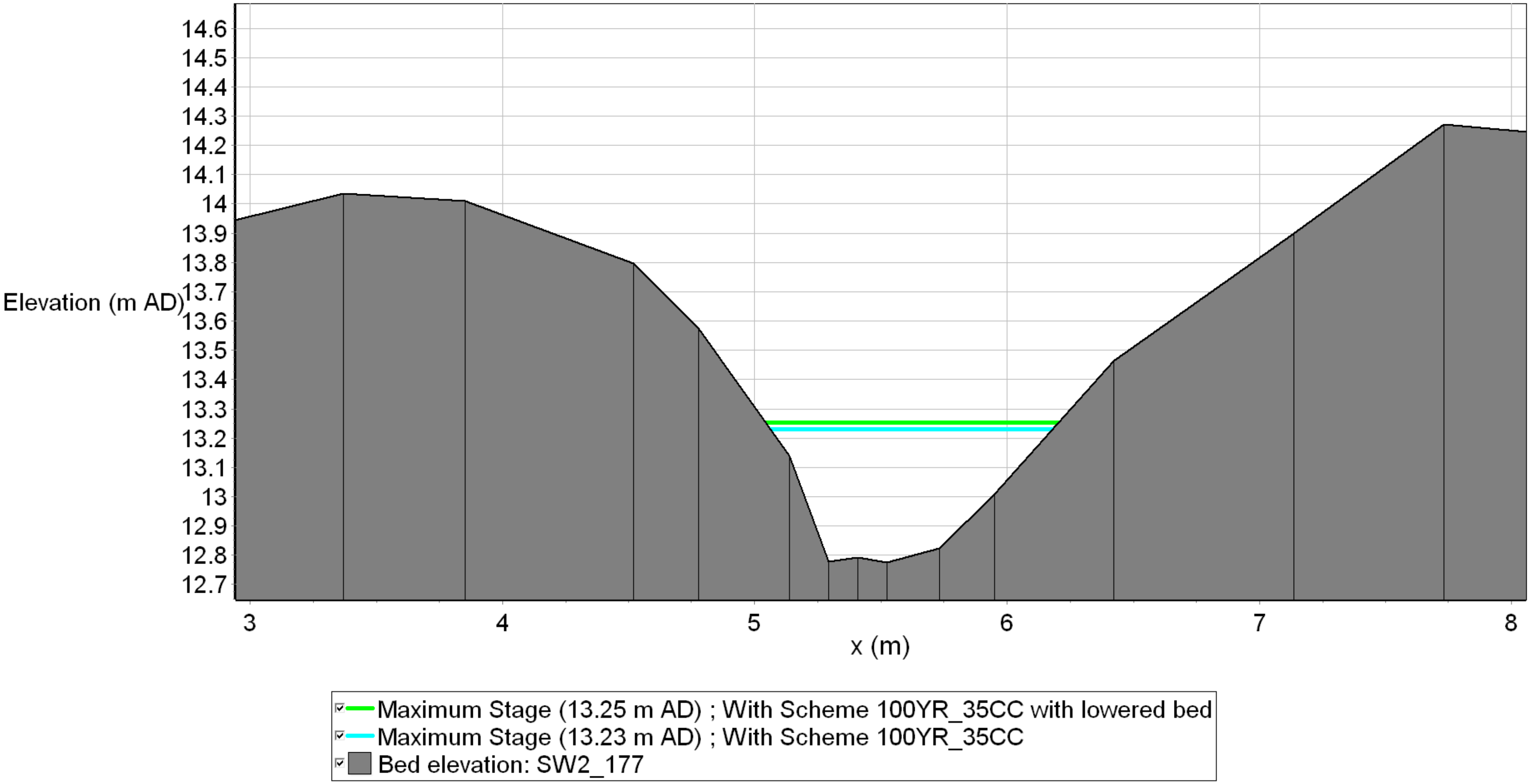
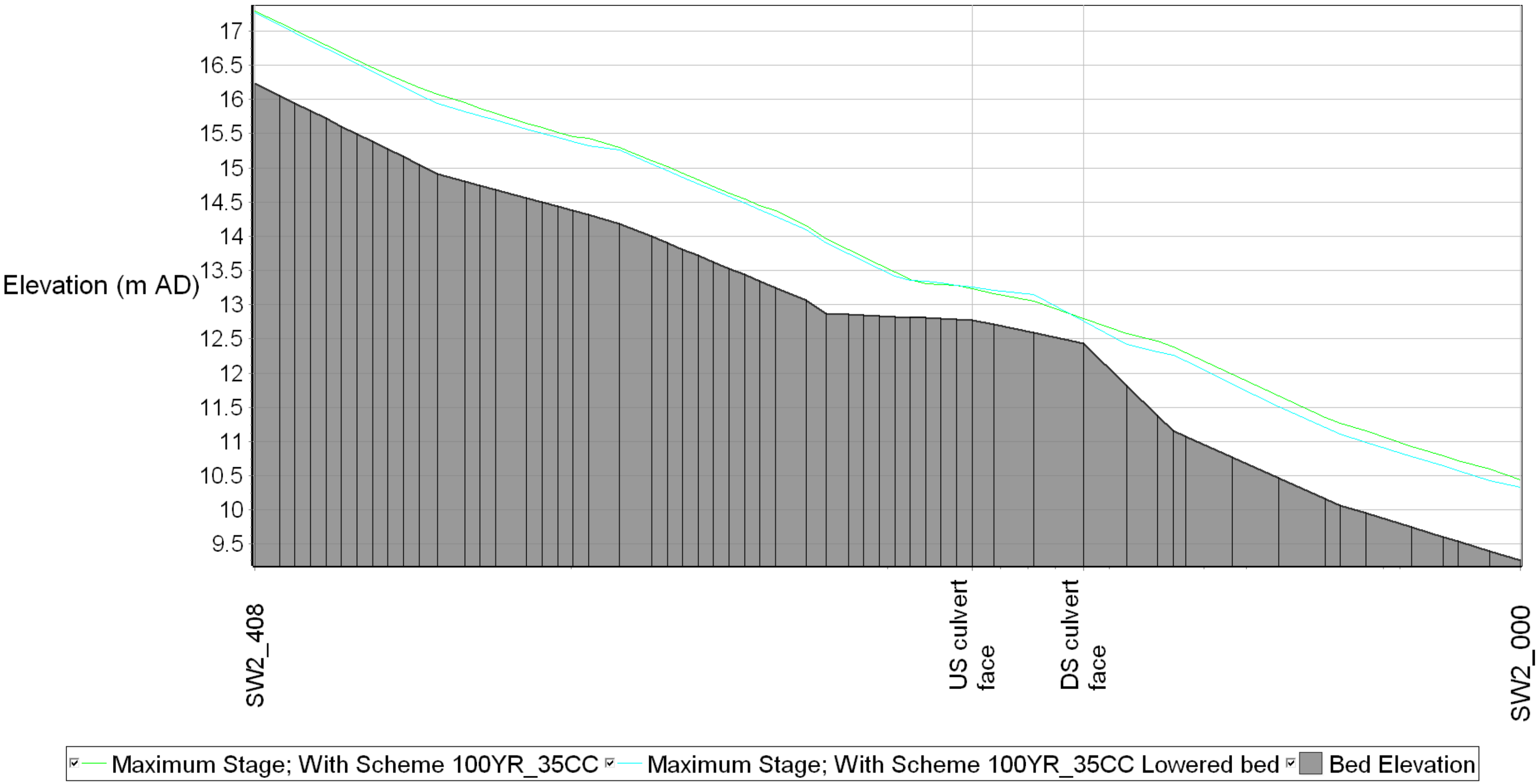


Plate 7.26. Comparison of peak water levels at crossing SW2 (long-section) – sensitivity test: channel geometry



7.2 On-site flood risk

7.2.1. As set out in **section 4.3** of this assessment, the Environment Agency Flood Map for Planning suggests the proposed development is in Flood Zone 1 and is at low risk of fluvial flooding (Ref. 1.17). However, it is understood the flood zone mapping does not extend to the upstream catchment extents, where the proposed development is located. Therefore, hydraulic modelling was conducted to assess on-site and off-site flood risk. The result of the modelling shows that Flood Zone 3 extents are generally within the watercourses or contained within a narrow floodplain.

7.2.2. Part of the proposed development is identified as being at high risk of surface water flooding (**Figure 3**). However, a review of the proposed link road crossings design indicates the finished road surface level is on average approximately 3m above the ground level for the five modelled crossings and at least 2m higher than the peak modelled levels for the 1 in 100-year with 65% climate change **Table 7.6**. A conservative 4% cross slope on the crossing has been applied with the expected cross slope anticipated between 1 – 2%. The comparison of finished road levels and peak water levels for the 1 in 100-year event with 65% climate change are presented in **Table 7.6**.

Table 7.5 Approximate difference between proposed road elevations and 1 in 100 +65%CC peak water level at crossing locations

Crossing location	Proposed road elevation (m AoD)	Lowest road elevation, taking 8.3m width (7.3m + 1m hard strip) with 4% cross slope lowering (m AoD)	Peak water level for 1 in 100-year +65%CC (m AoD)	Difference between peak water level and conservative proposed lowest road elevation (m)
SW1	13.51	13.22	10.11	3.11
SW2	16.50	16.21	13.28	2.93
SW3	11.50	11.21	8.14	3.07
SW4	N/A	N/A	7.73*	N/A
SW5	15.10	14.81	11.35	3.46
SW6	14.30	14.01	12.17	1.84
SW7	8.6 (closest cross section)	8.31	6.94*	1.37

**For watercourse crossings without modelled flood extents, LiDAR ground values have been taken from the edge of the Environment Agency Risk of Surface Water Flooding 1 in 1,000-year extent.*

7.2.3. The modelled results indicate the crossings would provide safe dry access, with significant additional freeboard up to the design on-site design standard (1 in 100 year with 65% climate change). Therefore, the proposed road crossings would not be at risk of fluvial flooding from the existing watercourses.

7.2.4. The proposed development would include positive drainage of the carriageway. Therefore, the carriageway would not be at risk of surface water flooding up to the design event for the highway drainage design.

7.2.5. The modelling also undertook sensitivity testing, which involved uplifting the flow hydrograph by 20%. This resulted in the modelled peak water levels slightly increased (up to 48mm for crossing SW1 and 68mm for crossing SW3) but still remaining in channel for the current proposed development design (crossings SW2, SW5 and SW6). The impact that the proposed development to off-site receptors is considered in **section 7.3** of this assessment.

7.2.6. A comparison was made of the modelled maximum water level with the 20% increase in flow at crossing SW1 of 10.21m AoD for the 1 in 100-year with 65% climate change allowance and the proposed road elevation of 13.51m AoD, showing that the road is approximately 3.3m above the water level. Therefore, the road is considered not to be at risk of flooding throughout the development lifetime.

7.2.7. A similar comparison was made of the modelled maximum water level with the 20% increase in flow at SW3 of 8.21m AoD for the 1 in 100-year with 65% climate change allowance and the proposed road elevation of 11.50m AoD, showing that the road is approximately 3.29m above the water level. Therefore, the road is considered not to be at risk of flooding throughout the development lifetime.

7.2.8. Overall, the modelling indicates the proposed Sizewell link road would not be at risk of flooding for 1 in 100-year event in the baseline and future scenarios.

7.3 Off-site flood risk

7.3.1. Upstream of the SW1 crossing, hydraulic modelling results indicate an increase in peak water levels over the baseline of 32mm upstream of the only residential property in the vicinity of the proposed development. This causes a small amount, up to 1m, of additional left bank flooding although it does not impact the property on the right bank (located on a higher ground approximately 10m away from the watercourse), as illustrated in **Plate 7.6**.

7.3.2. The realignment of the road means the analysis of the changes in peak water levels at the SW1 crossing cannot be compared directly as there is no comparable baseline, due to the two channels being in different locations, lengths and cross-sectional chainages. . Therefore, the impact on the watercourse and adjacent area was assessed by taking water levels from where the existing channel would remain upstream and downstream of the proposed watercourse diversion.

7.3.3. The analysis of peak water levels on the upstream node as a result of proposed crossing (**Table 7.3**) shows a maximum afflux of 32mm at the node 60m upstream of the diversion for the 1 in 100-year event with 35% climate change.

7.3.4. At crossings SW2, SW5 and SW6, there is no off-site impact with the 1 in 100-year with 65% climate change event. The maximum afflux of 10mm on the peak water levels remains within the channel (**Plate 7.1**, **Plate 7.2** and **Plate 7.3**). There are no dwellings or existing infrastructure in these areas, only agricultural land.

7.3.5. For crossing SW3 (Hawthorn Road), the proposed development does not increase water levels upstream of Hawthorn Road culvert (**Plate 7.10**). Between the two proposed crossings (Hawthorn Road and link road) there is a slight increase in peak water levels of 20mm, which only impacts a short distance into agricultural fields. Downstream of the link road crossing assessment shows no adverse change in water levels as a result of the scheme (**Plate 7.8**).

7.3.6. A series of sensitivity tests were conducted, which comprised of a further 20% increase in flow, a 20% increase in roughness and alignment of channel geometry where LiDAR data was used to inform the cross-sections. These flow roughness and alignment characteristics were considered to be the most significant uncertainties within the hydraulic modelling with the potential to affect the fluvial flood risk.

7.3.7. A review of the modelling results has considered the potential impact that the proposed development may have on off-site receptors. **Plate 7.14** to **Plate 7.18** show results of the sensitivity testing scenarios at key locations.

7.3.8. The results of the sensitivity testing on increase in flow have identified that, taking into consideration off-site impacts, the flood extent would slightly increase by up to 1m at crossing SW1 and crossing SW3. For the remaining crossings, the peak water levels would remain within the respective watercourse channels.

7.3.9. For crossing SW1 the slight increase in water levels would extend for a distance of approximately 80m upstream of the crossing for the 1 in 100-

year event with 35% climate change. A comparative review of the modelled water levels, cross sections and LiDAR data in this location has found that the flood extent would affect approximately 5m of agricultural land on the left bank of the watercourse. However, the residential property on the right bank of the watercourse would not be affected during this event.

7.3.10. At crossing SW3 there are two proposed culverts and the increase in peak water levels results in slight increase in flood depth (up to 19mm) in the area located between the two proposed culverts for the 1 in 100-year event with 35% climate change. In this location the only receptor likely to be affected by the increase in water level is agricultural land. There are no properties likely to be affected during this event and impact is not considered significant.

7.3.11. As identified in the preceding section there is limited impact on off-site receptors as a result of the proposed Sizewell link road development.

7.4 Applicability of Sustainable Drainage Systems

7.4.1. In accordance with National Planning Policy Guidance for Flood Risk and Development (Ref. 1.2), the sustainable drainage hierarchy has been applied and the comments on suitability are given in **Table 7.7**.

Table 7.6 Application of sustainable drainage hierarchy

Option	Comment	Viability
Into the ground (infiltration)	Runoff to be collected in swales and held temporarily allowing infiltration into the ground. Vegetation, soil and subsoil within the swale to provide treatment of the runoff reducing pollution impact. An initial review of geological conditions on site indicate the rate of infiltration will vary. Further infiltration testing would be undertaken to determine suitability. Current assumptions for the footprint of swales is that they would require a width of 3.5m with side slopes of no steeper than 1 in 3 and a flat base of 1m to provide an above ground storage volume. If further volume is required, there is potential for an additional filter trench in the base of the swales, which would provide additional storage volume. In locations where there is a greater impermeable area, the design provides added	Potential

Option	Comment	Viability
	infiltration basins in the vicinity to local watercourses and areas shown to be at risk of surface water flooding. These basins provide additional temporary storage and mitigate the impact of highway on overland flow routes. Should infiltration into the ground prove ineffective, the swales would discharge at a controlled rate to the watercourse.	
To a surface water body	It is not currently expected that discharge to watercourse will be required, however, it is possible at some locations to use this option should it be necessary. There are seven watercourse locations crossed by the proposed link road. Therefore, there is the potential to discharge at a controlled rate from the swales to the watercourses. Should infiltration into the ground prove effective, the swales would not discharge to the watercourse.	Potential
To a surface water sewer, highway drain, or another drainage system	The crossings are in a rural area where sewers are limited and there is a low likelihood of them being present. Anglian Water sewer records have not been consulted. Therefore, it is not known whether there are any public surface water sewers close to the site.	No potential
To a combined sewer	The crossings are in a rural area where sewers are limited and there is a low likelihood of them being present. Anglian Water sewer records have not been consulted. Therefore, it is not known whether there are any public combined sewers close to the site.	No potential

7.5 Water management and drainage

7.5.1. The existing site is 'greenfield' with the only impermeable surfaces being the existing roads that would connect to the proposed link road. The proposed development would increase the impermeable area. The increase in impermeable area has the potential to increase the surface water run-off and the associated flood risk both on-site and off-site.

7.5.2. The proposed development provides on-site drainage that incorporates sustainable drainage measures to ensure surface water run-off from the highway does not increase flood risk elsewhere for the lifetime of the site. Infiltration testing is being undertaken in the vicinity of the proposed infiltration basins and would be available to support the detailed design.

7.5.3. The **Outline Drainage Strategy** provided in **Volume 2, Appendix 2A** of the **ES**, provides information about the proposed surface water management and drainage for this development, including the design approach, use of SuDS and consideration of climate change.

7.5.4. The surface water run-off is proposed to mainly infiltrate to ground, with the option to discharge to a local watercourse if required. Should water be discharged to a local watercourse, this would be limited to the greenfield run-off rate.

7.5.5. Climate change would be taken into account in the detailed drainage design through the application of the appropriate rainfall intensity allowances as discussed in **section 6** of this assessment.

7.5.6. Monitoring and maintenance of the drainage system would be carried out to preserve the drainage system integrity and maintain the design capacity for the lifetime of the proposed development. Subject to the adoption of the highway, the highway maintenance would be carried out by the highway authority. However, prior to the adoption, SZC Co. would be responsible for the maintenance.

7.6 Access

7.6.1. The Environment Agency and Office of Nuclear Regulation Joint Advice Note (Ref.1.2) confirms that the road would need to have safe access in line with NPPF requirement, which is to the 1 in 1,00-year event with 65% climate change allowance.

7.6.2. The Environment Agency long term flood risk map (Ref. 1.18) identifies that access to or from the site could be affected during a high rainfall event, with road links in the area potentially inundated by surface water flooding. However, the proposed highway would be raised above the existing topography and the future fluvial flood levels as demonstrated by the hydraulic modelling results.

7.6.3. All access locations are situated in Flood Zone 1 and at low risk of fluvial flooding. The Environment Agency long term flood risk map identifies that access to or from the site could be affected during a high rainfall event, with road links in the area potentially inundated by surface water flooding.

7.6.4. During construction and operation, the proposed development would be accessed via a number of existing roads, from west to east; A12 roundabout north of The Red House Farm, B1122/ Middleton Moor link, Fordley Road south, Trust Farm Junction, B1122 at Title Road north, Hawthorn Road south, B1122/ B1125 Link, Pretty Road south, Moat Road, B1122/ Theberton Link, B1122 link at south of site.

7.6.5. The proposed development will form part of one access route to the Sizewell C site as well as other local connections. The road has been designed so it is not at flood risk; where it goes through valleys and crosses watercourses, the road is raised above the 1 in 100-year with 65% allowance for climate change level for the lifetime of the development. The Sizewell link road would therefore provide safe, dry access and egress.

7.6.6. An appropriate flood risk emergency plan would be in place for the construction and operation of the Sizewell link road. The flood risk emergency plan would be developed in accordance with NPPF and Environment Agency guidance. This could include the subscription to the flood warnings service.

7.7 Flood Risk Activity Permit and Land Drainage Consent

7.7.1. A Flood Risk Activity Permit is likely to be required from the Environment Agency for the permanent and temporary works for the crossing of the main river and other associated works that fall in, under, over or within 8m of the main rivers. A land drainage consent is unlikely to be required from Suffolk County Council as the proposed portal culvert does not form an obstruction to the watercourse crossings.

8 Management of Residual risk

8.1.1. In any development there is always a potential for there to be a residual flood risk to people and property due to:

- the failure of systems and defences;
- more extreme events than those defined in the NPPF; or
- uncertainties associated with modelled water levels.

8.1.2. Climate change is a potential residual risk for the site as the current future projections may not be met. Due to the elevation difference between the modelled flood extents and the proposed road layout, the risk of fluvial flooding when taking into account climate change to the site is still considered to be low.

8.1.3. Hydraulic modelling undertaken to assess the impact of the proposed development was run for more extreme events such as the 1 in 100-year events with 65% allowance for climate change and the 1 in 1,000-year event.

8.1.4. During construction, the construction phasing would be planned to minimise the floodplain constraints beyond those identified within the final design.

The embankments would be constructed with the proposed culverts in situ rather than constructing the culverts after the construction of the embankment.

8.1.5. A flood risk emergency plan would be in place for the construction and operation of the bypass as set out in the in the **Code of Construction Practice** (**CoCP**) (Doc Ref. 8.11). The flood risk emergency plan would be developed in accordance with NPPF and Environment Agency guidance.

8.1.6. Monitoring of the weather would be in place to monitor storm conditions. This would probably involve the registration of appropriate staff to the Environment Agency flood warnings and Met Office weather warnings to manage the potential impacts of flooding. This could lead to, if necessary, the halting of construction and the site temporarily evacuated.

8.1.7. The flood risk emergency plan would consider the potential requirement during the construction phase for provision of temporary pumping to mitigate the impact of any temporary floodplain loss.

8.1.8. Sustainable drainage and existing land drainage structures require regular maintenance to ensure continuing operation to design performance standards. Poor maintenance could result in increased risk of flooding from surface water. Due to the large size of the portal culverts and the fact that they do not encroach into the channel, the crossings are not considered to lead to any additional blockage risk.

8.1.9. During construction, the site traffic is likely to transfer loose sediment onto the vehicles that may be washed off into the swales and could reduce the volume capacity and the infiltration potential. In addition, any surface water treatment facility may also fill up with sediment. This may lead to a minor increase in the associated flood risk due to the loss of attenuation capacity.

8.1.10. In addition, a review of the exceedance flow routes would be necessary to consider the surface water flow routes and any impacts around the proposed development as part of the drainage design.

8.1.11. An appropriate surface water drainage maintenance and cleaning schedule would be undertaken to maintain the swale design capacity and capability. Further information regarding SuDS maintenance requirements would be given in the **Outline Drainage Strategy**.

9 Summary and conclusions

9.1.1. This report has considered all sources of flood risk and identified the flood risk mitigation measures included in the site layout.

9.1.2. **Table 4.1** shows flood risk from tidal, fluvial, groundwater, sewers and reservoirs are low.

9.1.3. Flood risk from surface water is variable across the site. The majority of the site is at 'very low' risk of flooding from surface water. However, areas associated with watercourses are at 'high' risk of flooding from this source. Due to this identified risk, hydraulic modelling was undertaken for five of the seven watercourse locations that would be crossed by the proposed development.

9.1.4. Results from the modelling for watercourse crossings of SW2 (Garden House Farm watercourse), SW5 (Pretty Road watercourse) and SW6 (Theberton watercourse) showed negligible afflux with negligible impact within channel.

9.1.5. Embedded design involving a diversion channel and additional flood relief culverts, to enable overflow routes to continue function, has significantly mitigated the impacts of the crossings at SW1 (Middleton watercourse) and SW3 (Hawthorn Road).

9.1.6. As a result of the proposed development and embedded mitigation at SW1, the increase in the modelled water levels is very local to the immediate upstream of the diversion channel and remains within channel and the adjacent Fordley road. The proposed crossing does not affect the only building near to the crossing, as it is at a higher elevation.

9.1.7. As a result of the proposed development and embedded design at SW3, the peak levels for all return periods including 100-year with 35% and 65% climate change allowance reduced compared to pre-development everywhere except a short length between the Hawthorne Road and Sizewell link road culverts, where it increased by about 20mm depth. The impact of this localised increased is negligible. The flood risk was considered to have no effect on the only property in the vicinity of the property.

9.1.8. Three sensitivity testing scenarios were conducted, which were: a 20% flow increase to account for hydrological uncertainties, the lowering of modelled bed level to account for limited channel survey information, and 20% increase in roughness to account for channel roughness uncertainties. All the sensitivity tests results showed the impacts of the changes were not significant enough to affect the robustness of the model results and the impact of the development. In all scenarios and return periods, the actual difference between the peak water levels between the developed and baseline scenarios reduced marginally.

9.1.9. As the proposed development is in Flood Zone 1, there would be no loss in functional floodplain storage or displacement of sea or river flood water from the proposed development.

9.1.10. The proposed development is classed as being 'essential infrastructure' under the NPPF and is located in Flood Zone 1. As per the Flood Risk Vulnerability and Flood Zone Compatibility table, the development is considered appropriate in terms of flood risk vulnerability.

9.1.11. Due to the limited high-level modelling used for the floodplain mapping, further modelling carried out showed that the crossings will be much higher than the peak levels from the design off-site flows, highlighting the road design has ensured safety of users.

9.1.12. In line with the guidance in the ONR and Environment Agency Joint Advice Note (Ref. 1.2), this assessment has applied the climate change guidance required by the NPPF.

9.1.13. The increase in impermeable area associated with the proposed development will require sustainable management of surface water run-off. The proposed development would include positive drainage of the carriageway. Therefore, the carriageway would not be at risk of surface water flooding up to the design event for the highway drainage design.

9.1.14. The surface water run-off would be treated before being discharged to ground. Should this not be achievable the surface water run-off would be attenuated before being discharged at a controlled greenfield run-off rate to a local watercourse.

9.1.15. An appropriate surface water drainage maintenance and cleaning schedule would be undertaken to maintain the swale design capacity and capability. Further information regarding SuDS maintenance requirements would be given in the **Outline Drainage Strategy (Volume 2, Chapter 2, Appendix 2A** of the **ES)**.

9.1.16. The proposed development is an access road to the Sizewell C site as well as other local connections. The road has been designed so it is not at flood risk. Where it goes through valleys and crosses watercourses, the road is raised above the 1 in 1,00-year with 65% allowance for climate change water level for the lifetime of the development. The Sizewell link road will provide safe, dry access and egress.

9.1.17. During construction, the construction phasing would be planned to minimise the floodplain constraints beyond those identified within the final design. The embankments would be constructed with the proposed culverts in situ rather than constructing the culverts after the construction of the embankment.

9.1.18. An appropriate flood risk emergency plan would be in place for the construction and operation of the bypass. The flood risk emergency plan would be developed in accordance with NPPF and Environment Agency guidance.

9.1.19. Monitoring of the weather would be in place to monitor storm conditions. This would probably involve the registration of appropriate staff to the Environment Agency flood warnings and Met Office weather warnings to manage the potential impacts of flooding. This could lead to, if necessary, the halting of construction and the site temporarily evacuated.

9.1.20. Based on the information presented, the proposed mitigation measures and in line with Environment Agency, ONR and NPPF guidance, the development site is considered to be appropriate in terms of flood risk.

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