East Devon District Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site Code	**Brcl_31**
Address	Land to the east of the M5, West Clyst
Area	109.8 hectares
Current land use	Greenfield
Proposed land use	Housing and mixed use
Flood Risk Vulnerability	More vulnerable
Sources of flood risk	
Location of site	The site is located to the east of the M5 in West Clyst, with Mosshayne Lane crossing through the centre. The site is adjacent to both the River Clyst on the north/eastern boundary and the Pin Brook to the southern boundary. A small unnamed tributary also crosses the southwestern corner of the site within a small valley.
Topography	The Environment Agency's 1m resolution 2022 Composite LiDAR shows that the topography of the site declines from the centre of the site (37mAOD) out to the eastern/southeastern site boundaries (10mAOD) and into a small valley watercourse crossing the southwestern corner of the site (13.5mAOD) with a gradual decline. The gradient varies across the site with an approximate value of 7%, therefore the site is considered to have a gentle slope, and there is potential some ground alterations may be required to accommodate any proposed SuDS features. The catchment therefore drains east into the River Clyst and south into the Pin Brook.
Existing drainage features	The site has been identified to drain into a number of watercourses located to the east and south of the site and onsite in the southwestern corner into an unnamed tributary. A number of field ditches are also present along the hedge lines.
Fluvial	**Available data and mapping:** Environment Agency Flood Map for Planning for Rivers and Sea. **Data analysis:** Details of the sites location within each Flood Zone are provided within the SFRA Site Screening Appendix. **Flood characteristics:** The site is partially located within Flood Zone 2 and 3 along the north, east and southern boundaries of the site adjacent to the River Clyst and Pin Brook respectively. The remainder (the majority) of the site is located within Flood Zone 1. • Flood Zone 1 represents areas which have less than 1 in 1000 (0.1%) chance of river flooding in a given year. • Flood Zone 2 represents areas which have less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of river flooding in a given year. • Flood Zone 3 representing an area greater than 1 in 100 (1%) chance of river flooding in a given year. As there is no detailed modelling available for this site, Flood Zone 3a has been used as a proxy for Flood Zone 3b. Detailed modelling should be undertaken as part of a detailed site-specific Flood Risk Assessment to define the extent of Flood Zone 3b.

East Devon District Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site Code	**Brcl_31**
Address	Land to the east of the M5, West Clyst
	In the absence of detailed modelling, the Risk of Flooding from Surface Water dataset has been used to assess the depth, hazard and velocity flood risk to the site, as extents are shown to be similar to the Flood Zones. Consideration should still be given to the Flood Zones and detailed modelling may be required within a site specific assessment.
Fluvial plus climate change	In the absence of detailed modelling, the Risk of Flooding from Surface Water dataset with a climate change allowance has been used to assess the depth, hazard and velocity flood risk to the site, as extents are shown to be similar to the Flood Zones. Consideration should still be given to the Flood Zones and detailed modelling may be required within a site specific assessment.
Surface Water	**Available data and mapping:** Environment Agency's Risk of Flooding from Surface Water dataset for the 3.33%, 1% and 0.1% AEP events. Brcl_31 - Surface Water 3.33% AEP – Depth Brcl_31 - Surface Water 3.33% AEP – Hazard Brcl_31 - Surface Water 3.33% AEP - Velocity Brcl_31 - Surface Water 1% AEP – Depth Brcl_31 - Surface Water 1% AEP – Hazard Brcl_31 - Surface Water 1% AEP - Velocity Brcl_31 - Surface Water 0.1% AEP – Depth Brcl_31 - Surface Water 0.1% AEP – Hazard Brcl_31 - Surface Water 0.1% AEP - Velocity **Data analysis:** **3.3% AEP (1 in 30 year) event:** Proportion - 2% Max Depth – 1.81m; Mean Depth – 0.35m Max Velocity – 1.85m/s; Mean Velocity – 0.24m/s Max Hazard – 2.05; Mean Hazard – 0.95 **1% AEP (1 in 100 year) event:** Proportion - 4% Max Depth – 1.86m; Mean Depth – 0.3m Max Velocity – 2.55m/s; Mean Velocity – 0.23m/s Max Hazard – 2.17; Mean Hazard – 0.9 **0.1% AEP (1 in 1000 year) event:** Proportion - 10% Max Depth – 1.99m; Mean Depth – 0.29m Max Velocity – 2.83m/s; Mean Velocity – 0.29m/s Max Hazard – 2.66; Mean Hazard – 0.93 **Flood characteristics:** The site is shown to be at risk of flooding along the north, east and southern boundaries and along the eastern and southwestern watercourses within the site during all three AEP events with a maximum depth of 0.35m in the 3.3% AEP event. The extent of flooding increases across the 1% and 0.1% AEP events, with additional flows in the 0.1% AEP event along the small watercourse to the south. It is therefore evident that as the flooding extent increases, the average flood depth decreases. The mean velocity and hazard within the 0.1% AEP event are shown to be 0.29m/s and 0.93 (a 'danger to some') respectively.

East Devon District Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site Code	**Brcl_31**
Address	Land to the east of the M5, West Clyst
Surface water plus climate change	**Available data and mapping:** Environment Agency's Risk of Flooding from Surface Water dataset for the 3.33%, 1% and 0.1% AEP events with 65% Climate Change scenarios. Brcl_31 - Surface Water 3.33% AEP plus 65% Climate Change – Depth Brcl_31 - Surface Water 3.33% AEP plus 65% Climate Change – Hazard Brcl_31 - Surface Water 3.33% AEP plus 65% Climate Change - Velocity Brcl_31 - Surface Water 1% AEP plus 65% Climate Change – Depth Brcl_31 - Surface Water 1% AEP plus 65% Climate Change – Hazard Brcl_31 - Surface Water 1% AEP plus 65% Climate Change - Velocity Brcl_31 - Surface Water 0.1% AEP plus 65% Climate Change – Depth Brcl_31 - Surface Water 0.1% AEP plus 65% Climate Change – Hazard Brcl_31 - Surface Water 0.1% AEP plus 65% Climate Change – Velocity **Management Catchment:** Brcl_31 is located within the East Devon Management Catchment. The Environment Agency guidance recommends that the Upper End allowance is considered for both the 3.3% and 1% AEPs for the 2070's epoch, unless the allowance for the 2050's epoch is higher, in which case this should be used. This is appropriate for development with a lifetime beyond 2100. The recommended uplift on peak rainfall intensity for the 3.3% AEP is 40% and for the 1% AEP is 45%. As Risk of Flooding from Surface Water data with a 65% uplift was already available this has been used as the best available data for the 3.3%, 1% and 0.1% AEPs. **Data analysis:** **3.3% AEP (1 in 30 year) plus 65% climate change event:** Proportion - 8% Max Depth – 1.97m — Mean Depth – 0.31m Max Velocity – 2.61m/s — Mean Velocity – 0.28m/s Max Hazard – 3.24 — Mean Hazard – 0.96 **1% AEP (1 in 100 year) plus 65% climate change event:** Proportion - 11% Max Depth – 2.11m — Mean Depth – 0.37m Max Velocity – 2.8m/s — Mean Velocity – 0.36m/s Max Hazard – 4.42 — Mean Hazard – 1.07 **0.1% AEP (1 in 1000 year) plus 65% climate change event:** Proportion - 17% Max Depth – 2.62m — Mean Depth – 0.71m Max Velocity – 5.13m/s — Mean Velocity – 0.52m/s Max Hazard – 8.97 — Mean Hazard – 1.41 **Flood characteristics:** The site is shown to be at risk of flooding in all three scenarios with flooding along the north, east and southern boundaries. The mean depth is shown to be 0.71m in the 0.1% AEP event plus 65% climate change. The average velocity on site is 0.52m/s, with a maximum of 5.13m/s. The average hazard rating during the 1% AEP plus 65% climate change event is 1.07 and is therefore stated to be a 'danger to some'.
Reservoir	The site is not located near to a Wet or Dry day reservoir flooding extent, according to the Environment Agency's reservoir flood mapping.

East Devon District Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site Code	**Brcl_31**
Address	Land to the east of the M5, West Clyst
Groundwater	**Available data and mapping:** The JBA Groundwater Flood Data Map (GW5) is provided as a 5m resolution grid. Brcl_31 - Groundwater Emergence **Flood characteristics:** During a 1% AEP groundwater flood event, groundwater levels on site are mixed and comprise of all levels of groundwater from: at or very near (within 0.025m of) the ground surface, to levels at least 5m below the surface, or at low risk. The highest risk of groundwater flooding is predominantly located within the southwest and southeast of the site, with the lowest risk in the north. Flow paths would be expected to follow the topography of the site and be similar to surface water flow paths. The risk of groundwater flooding will require further consideration in a site-specific flood risk assessment.
Sewers	No evidence of sewer flooding has been identified at or near the development site.
Flood history	**Available data and mapping:** Environment Agency's Recorded Flood Outlines. **Flood characteristics:** A small portion along the north, east and southern boundary of the site are shown to be located within the Environment Agency's Recorded Flood Outlines extent. These events are all due to the River Clyst exceeding capacity in 1965, 1972, 1980 and 1992. There are no flooding incidents within Devon County Council's dataset recorded within 100m of the site.
Policy zones	
Critical drainage areas	The site has not been identified to be located within a critical drainage area. Mapping: Brcl_31 - Critical Drainage Area
Coastal change management areas	The site has not been identified to be located within a coastal change management area.
Flood risk management infrastructure	
Existing defences	The Environment Agency's AIMS dataset shows there are no formal flood defences within the vicinity of the site.
Emergency planning	
Flood warning	The eastern and southeastern boundaries of the site have been identified to be located within an area of flood alerts for the River Clyst, Culm and their tributaries. The eastern boundary of the site is also located within the River Clyst from Broadclyst to Clyst St Mary flood warning area. Mapping: Brcl_31 - Flood Warnings and Alerts

East Devon District Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site Code	**Brcl_31**
Address	Land to the east of the M5, West Clyst
Access and egress	Access and egress is shown to be largely unaffected during all assessed events, with depths of up to 0.34m in a small, localised area on Mosshayne Lane to the west of the site shown in the 1% AEP plus climate change surface water modelling.
Requirements for drainage control and impact mitigation	
Broad-scale assessment of possible SuDS	**Geology and Soils** The geology consists of interbedded sandstone and conglomerate, with mudstone, siltstone and sandstone to the northwest of the site. The southwestern portion of the site contains no superficial deposits, whilst the northeast consists of clay, silt and sandstone. The soils are shown to be predominantly freely draining slightly acid sandy soils, with slightly acid loamy and clayey soils with impeded drainage to the north. A small section to the far north adjacent to the River Clyst is shown to be loamy and clayey floodplain soils with naturally high groundwater. This suggests that infiltration is unlikely to be a viable means of surface water disposal in the north but may be viable in the south. However, the infiltration potential of the site should be confirmed through infiltration testing, in line with BRE 365. **SuDS** • The site is also located within a nitrate vulnerable zone. Therefore, early engagement with the LLFA and the EA is recommended to determine requirements for the site to manage the impact to surrounding watercourses. Consideration of water quality is likely to be of high importance and demonstrated through the use of the Simple Index Approach. • The site has not been identified to be located within a historic landfill site or a groundwater Source Protection Zone. • Groundwater levels on site are extremely varied, and infiltration on site may be unlikely in some areas to the north due to impeded drainage from clayey soils, and the steep topography. The infiltration potential of the site should be confirmed through infiltration testing, in line with BRE 365. Offsite discharge may therefore be required to discharge surface water runoff. • Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • Drainage should mimic existing catchments. SuDS measures should follow the discharge hierarchy, and if it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner. • Due to the topography, any surface water not intercepted via infiltration will drain via gravity to the north/eastern boundary towards the River Clyst, or into the small tributary in the southwestern corner. It is therefore recommended that the LLFA and the EA are consulted about

Site Code	**Brcl_31**
Address	Land to the east of the M5, West Clyst
	viable discharge locations for surface water from the site and their attenuation potential.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could also provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints. • The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • SuDS are to be designed so that they are easy to maintain, and it should be set out who will maintain the system, how the maintenance will be funded and should be supported by an appropriately detailed maintenance and operation manual. • SuDS should be designed with a holistic approach, combining ecology, landscape and drainage requirements specific to the site, incorporating Biodiversity Net Gain requirements. • Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality, along with the location of the site in a Nitrate Vulnerable Zone. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. • SuDS should be designed in line with Devon County Councils SuDS Guidance. https://www.devon.gov.uk/floodriskmanagement/document/sustainable-drainage-system-guidance-for-devon-2023/#dcc-documents-cpt-contents
NPPF and planning implications	
Exception Test requirements **(Local Authority considerations)**	The Local Authority will need to confirm that the Sequential Test has been carried out in line with national guidelines. The Sequential Test will need to be passed before the Exception Test is applied. The NPPF classifies the usage as "More Vulnerable"; this type is taken into consideration for the Exception Test. The site is partially located within Flood Zone 2 and 3, and the 0.1% AEP surface water extent, however providing development is proposed outside of the areas at risk (within Flood Zone 1), the Exception Test is not required for this site. Should development be proposed within Flood Zone 2 or 3, the

East Devon District Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site Code	**Brcl_31**
Address	Land to the east of the M5, West Clyst
	Exception Test will be required and detailed flood modelling should be undertaken during a site-specific FRA.
Requirements and guidance for site-specific Flood Risk Assessment **(Developer considerations)**	**Flood Risk Assessment:** The Level 1 SFRA has more guidance on this section and any relevant policies and information applicable to development within East Devon District Council. • Consultation with the East Devon District Council, and where relevant South West Water, Devon County Counciland the Environment Agency should be undertaken at an early stage. • Developers should consult with South West Water to ensure that the development aims to help achieve the targets of the Drainage and Wastewater Management Plan. • Development plans should use the Level 1 SFRA for East Devon District Council, as well as the Local Flood Risk Management Strategies to identify cumulative flood risk issues. It should also promote an integrated approach to water management. • The site is located within a medium risk Cumulative Impact Assessment (CIA) catchment and therefore specific CIA policy documents are applicable to this site. **Guidance for site design and making development safe:** • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates do not exceed greenfield rates. • Arrangements for safe access and egress are likely to be possible, however these will need to be considered further within a site-specific FRA for the surface water events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.

Key messages

The site is generally identified to be at low risk, and development is likely to progress if:

- A site-specific FRA is undertaken to assess the risk of fluvial, surface water and groundwater flooding in relation to the proposed development, and the access and egress arrangements.
- Development is placed outside of the areas at risk from surface water and fluvial flooding and within Flood Zone 1. Should development be proposed within areas at risk (within Flood Zones 2 and 3) detailed flood modelling should be undertaken within a site-specific FRA. Any development within Flood Zone 3 should be allocated as an undeveloped open space corridor, and not as gardens, car parking or other features associated with

individual plots. It should also be noted that the site should not discharge surface water into combined sewer.

- Infiltration rates are assessed on site as part of a drainage strategy.
- There is early engagement with the LLFA and the EA on the proposed SuDS measures and infiltration rate to discuss requirements on the site meeting relevant conditions due to the sites location within a nitrate vulnerable zone.
- Cumulative Impact Assessment policy documents must be understood, and the cumulative impact of development should be considered.