Appendix J: Ecology Risks & opportunities

	Feature habitat & associated species	Distribution	Protected sites: Site name	Protected sites: Importance: International, European, National, Local *	Related Policies & Legislation	Sensitivity to WCS hazards	Water resources (water abstraction)	Flood risk management	Waste water treatment	Sewer capacity	Development footprint (direct)	Risk	Opportunities
Context							Existing public water supply from groundwater, except Clapham supplied from River Great Ouse. Additional resource from Grafham water as needed. No new abstractions proposed; existing licences will be used supplemented from Grafham Water. Pulloxhill reservoir consent is dormant but will be used to support increased demand. Marston Vale: Preliminary Water Cycle Strategy (2008) suggests abstraction of non-potable water from lakes within footprint of Eco-town.	Increased rates & volumes of run-off will be attenuated within development areas except: - **North of Fields Road, Wootton** (creation of offsite Van Dieman's Land lake & watercourse improvement) - **Wixams** (Watercourse improvements & channel diversions) - **Land off Cambridge Road** (In-channel storage upstream of Cardington Cross & compensation within river corridor for land raising in floodplain) - **Kempston Harwick (**use of Kempston Harwick Pits for flood attenuation) - **Land North of Wixams beside B530** (use of Elstow South Lakes for flood attenuation) Marston Vale: Preliminary Water Cycle Strategy (2008) suggested use of lakes within footprint of **Eco-town** for flood alleviation purposes. Information on flood alleviation options for key service centres, some development areas & effect of releasing water from long term storage **not available** for this assessment.	9 WwTWs (Biggleswade, Clifton, Bedford, Clophill, Flitwick, Marston Moritaine, Popgyhill, Potton, Sandy) are most likely to be affected by the proposed growth. Increases in wastewater discharges has the potential to increase river flows & levels. However, waste water discharges will still meet consented water quality standards - therefore no decrease in water quality. There are problems with accommodating additional flows at Marston Mortaine WwTW as a result of the proposed Marston Vale Development. Options include: replacement of Stewartby WwTW, construction of a new WwTW in vicinity of Marston Moretaine & Stewartby, or upgrade Bedford WwTW & construct new sewer.	New sewer from Marston Vale to Bedford WwTW instead of new WwTW in the vicinity of Stewartby & Marston Moretaine. Minor sewer network & recommendations for pipe improvements & new pipes not considered during this assessment as these will be considered at a local level by Anglian Water.			
Standing open water - lakes & margins	Standing open water - lakes & margins habitat	Gravel pits along River Great Ouse, Elstow Brook & River Ivel. Scattered distribution of other lakes within study area.		N	UK BAP habitat; LBAP habitat	**Change in hydrology e.g. reduction in ground water & surface levels from abstraction activities. Decrease in water quality e.g. if link exists between river & lake during a flood event. Physical loss of habitat e.g. from development footprint. Disturbance to fauna e.g bird populations.**	Increased abstraction from Pulloxhill Reservoir likely to lower water levels. However, this abstraction is consented by the Environment Agency, & is therefore not considered to be a risk to the water & wetland features within the reservoir. Increased abstraction from Marston Pit, Brogborough Lake, Kempston Hardwick Pits, Stewartby Lake & Coronation Pit has the potential to lower water levels, creating a risk to fish (such as trout in Stewartby Lake), aquatic invertebrates & plants.	Floods that have the potential to displace small fish downstream, especially where there is little refuge & shelter for fish to escape the flows. Flooding along Ouse Valley displaces fish, including large carp, from gravel pits into the main river. Carp mayout-compete the natural riverine species. Utilising Elstow South Lakes, Marston Pit, Brogborough Lake, Kempston Hardwick Pits, Stewartby Lake & Coronation Pit for flood attenuation would lead to the increased flooding of these waterbodies. Increased flooding has the potential to impact associated bird species on the margins of the water should the flood event coincide with the breeding season, & there is a risk of loss of marginal habitats.	Waste water from Marston Moretaine WwTW discharges to Marston Brook, which flows almost immediately into Stewartby Lake. The lake is a designated Cyprinid Fishery under the Freshwater Fish Directive, but is known to suffer from algal blooms. Any change in water quality, may pose a risk of increased algal blooms & associated risks for aquatic species & their predators.	The route of proposed Sewer from Marston Vale to Bedford WwTW was not known at the time of this ecological risk assessment although the approximate footprint does run in close proximity to locally important water bodies (Stewartby Lake & Priory Country Park lakes) creating a potential risk of habitat loss.	Open water habitats within the footprint of the East Ampthill, Broom, Wixham & Henlow development areas. Potential risk of direct habitat loss & resulting impacts to associated species such as breeding bird & waterbird assemblages, wintering waterbird species, & fish. Bank vole population in Broom Lake. Open water habitat within the footprint of the proposed Eco town at Maston Vale includes Brogborough Lake, Marston Pit, Stewartby Lake, Kempston Harwich Pit, Hanson Lake, & Coronation Pit. This creates a potential risk of direct habitat loss & resulting impacts to associated species such as breeding bird & waterbird assemblages, wintering waterbird species, & fish.	<u>Water resources</u> Increased abstraction has the potential to lower water levels, creating a risk to fish, aquatic invertebrates and plants, loss of locally important and UK BAP Priority marginal habitats such as marshy grassland and reedbed habitat. <u>Flood risk management:</u> Floods have the potential to displace small fish downstream, especially where there is little refuge and shelter for fish to escape the flows. Flooding along the Ouse Valley displaces fish, inc large carp, from gravel pits adjacent to the Bedford Ouse into the main river. The loss of carp into running water is of particular concern, where they have the ability to out-compete the natural riverine species. Utilising Elstow South Lakes, Marston Pit, Brogborough Lake, Kempston Hardwick Pits, Stewartby Lake and Coronation Pit for flood attenuation would lead to the increased flooding of these waterbodies, potentially impacting associated bird species on the margins of the water should the flood event coincide with the breeding season, and marginal habitats. <u>Sewer capacity:</u> Risk of habitat loss. <u>Development footprint:</u> Risk of habitat loss, and associated species e.g. breeding breeding bird and waterbird assemblages, wintering waterbird species, and fish.	<u>Flood risk management:</u> Flood attenuation as part of the proposed development areas has the potential to provide habitat creation opportunities, including ponds, lakes, wet woodland, ditches, wet grassland, and reedbeds. Depending on flooding extent, duration, and frequency there may be habitat creation opportunities at Kempston Pits and Elstow Pits which are proposed to be used for flood alleviation. <u>Waste water treatment:</u> Improvements in water quality could improve numbers and distribution of species (WFD requirements will set more stringent water quality standards). <u>Development footprint:</u> Open water and grazing marsh habitats are located within the footprints of the East Ampthill, Broom, Wixham, Henlow, Bromham, east of Kempston, Biggleswade, Sandy and the Eco-town development areas. Careful design of the development areas and the management of water could be used to increase the quality and extent of these habitats.
	Fish	Stewartby Lake is a designated Cyprinid Fishery under the Freshwater Fish Directive (pike, trout, eel, chub, perch, roach, tench) Harold County Park CWS (pike, carp, bream, roach, tench, perch) Radwell & Sharnbrook Complex (carp, bream, tench, perch)	Barford Gravel Pit CWS; Brogborough Lake CWS; Bromham Lake LNR; Coronation Pit CWS; Felmersham Gravel Pits SSSI; Great Barford Gravel Pit CWS; Harrold Country Park CWS; Lidlington Pit CWS; Radwell Pits CWS; Poppyhill Pits CWS; Southill Lake; Stewartby Lake CWS; Stockgrove Country Park CWS; Wrest Park CWS; Wyboston Pits CWS	I / N	Bern Convention; Habitats Directive; Priority UK BAP Species (eel & spined loach only); LBAP (spined loach)								
	Flora (whorled water milfoil)		Felmersham Gravel pits SSSI	R	UK BAP species								
	Birds		Brogborough Lake CWS; Coronation Pit CWS; Felmersham Gravel pits SSSI; Flitwick Moor CWS; Begwary Brook Pits CWS; Elstow pit CWS; River Flit CWS; South Mills Pits CWS;Stewartby Lake CWS; Warren Villas CWS; Wrest park Grounds CWS; Great Barford Gravel Pits CWS; Cityfield Farm Pits CWS; Stewartby Lakes CWS; Zwetsloots Pits CWS; Marsh Vale County Park.	N / R / L	Wildlife & Countryside Act 1981 (as amended); Priority UK BAP species (reed bunting & lapwing); IUCN Red List species (reed bunting only); IUCN Amber List (mute swan, pochard, water rail, willow warbler, bearded tit, lapwing)								

	Feature habitat & associated species	Distribution	Protected sites: Site name	Protected sites: Importance: International, European, National, Local *	Related Policies & Legislation	Sensitivity to WCS hazards	Water resources (water abstraction)	Flood risk management	Waste water treatment	Sewer capacity	Development footprint (direct)	Risk	Opportunities
Context							Existing public water supply from groundwater, except Clapham supplied from River Great Ouse. Additional resource from Grafham water as needed. No new abstractions proposed; existing licences will be used supplemented from Grafham Water. Pulloxhill reservoir consent is dormant but will be used to support increased demand. Marston Vale: Preliminary Water Cycle Strategy (2008) suggests abstraction of non-potable water from lakes within footprint of Eco-town.	Increased rates & volumes of run-off will be attenuated within development areas except: - **North of Fields Road, Wootton** (creation of offsite Van Dieman's Land lake & watercourse improvement) - **Wixams** (Watercourse improvements & channel diversions) - **Land off Cambridge Road** (In-channel storage upstream of Cardington Cross & compensation within river corridor for land raising in floodplain) - **Kempston Harwick (**use of Kempston Harwick Pits for flood attenuation) - **Land North of Wixams beside B530** (use of Elstow South Lakes for flood attenuation) Marston Vale: Preliminary Water Cycle Strategy (2008) suggested use of lakes within footprint of **Eco-town** for flood alleviation purposes. Information on flood alleviation options for key service centres, some development areas & effect of releasing water from long term storage **not available** for this assessment.	9 WwTWs (Biggleswade, Clifton, Bedford, Clophill, Flitwick, Marston Moritaine, Poppyhill, Potton, Sandy) are most likely to be affected by the proposed growth. Increases in wastewater discharges has the potential to increase river flows & levels. However, waste water discharges will still meet consented water quality standards - therefore no decrease in water quality. There are problems with accommodating additional flows at Marston Mortaine WwTW as a result of the proposed Marston Vale Development. Options include: replacement of Stewartby WwTW, construction of a new WwTW in vicinity of Marston Moretaine & Stewartby, or upgrade Bedford WwTW & construct new sewer.	New sewer from Marston Vale to Bedford WwTW instead of new WwTW in the vicinity of Stewartby & Marston Moretaine. Minor sewer network & recommendations for pipe improvements & new pipes not considered during this assessment as these will be considered at a local level by Anglian Water.			
Rivers & Streams	Rivers & Streams habitat	River Great Ouse; Pertenhall Brook / Riseley Brook; Sharn Brook; Kimbolton headwaters; River Ivel / Hiz / Purwell; River Ivel Navigation / Hit / Flit;Elstoe Brook; Begwary Brook; Stone Brook; Millbridge / Common Brooks; Broughton Brook; Fancott Brook/Flit; Henlow Brook; Ivel; Pix Brook; Compton Brook; Henxton brook; Barton Brook; New Inn Brook; Flit.	Aspley Guise Meadows CWS; Biggleswade Common CWS; Buckle Grove CWS; Flit Valley CWS; Harrold lake CWS; Henlow Park Wood CWS; Kings Wood & Glebe Meadows, Houghton Conquest SSSI; King's Wood, Houghton Conquest CWS; Mill Rise, Turvey CWS; Millbrook CWS; Millbrook Warren CWS; Moors Plantation CWS; River Flit CWS; River Great Ouse CWS; River Ivel & Hiz CWS; Sandy Disused Railway CWS; Sandy Meadow CWS; Stevington Marsh SSSI; Wavendon Heath Ponds SSSI; Arlesey meadows CWS; Langford Common CWS; Old Warren Disused Railway CWS; South Mills Pits CWS; Warren Villas CWS; Zwetsloots Pits CWS; Bromham Park CWS; Bromham Water Meadows CWS; Felmersham Marsh Meadow CWS; Fenlake Meadow CWS; Harrold Country Park CWS; Little Barford CWS; Priory Country Park CWS; Stevington Meadow CWS; Wyboston Pits CWS; Flitwick Moor CWS; Lower Alders CWS; Upper Alders CWS.	N	Priority UK BAP habitat (Rivers); LBAP habitat	**Change in channel morphology** e.g. erosion from additional flows, flood defence structures. **Decrease in water quality** e.g. nutrient enrichment, change in water chemistry, contamination. **Change in hydrology** e.g. reduction in surface or ground water levels. **Physical loss of habitat** e.g. from development footprint	The River Flit, River Ivel & Bedford Ouse are classified by the Environment Agency as "no water available" (Upper Ouse & Bedford Ouse CAMS), but there are no indications that the development will require additional abstraction from them.	Watercourse improvements & in-channel storage (likely to require widening) have the potential to cause loss of river & bankside habitats. Associated fish, invertebrates & water voles may also be at risk. If increased flooding of the River Great Ouse occurs from releasing water from long term storage, there is a risk that flooding along the Ouse Valley may displace fish, including large carp, from gravel pits into the main river.	Four WwTW (Potton, Flitwick, Clifton & Sandy) have been identified as having capacity within their current consented water quality standards & discharge volumes accommodate demand from proposed development. Therefore, it is considered that there will not be a decrease in water quality compared with current water quality. Five WwTW have been identified as needing to increase their consented water discharge volumes in response to the demand from increased development. They are Bedford, Biggleswade, Clophill, Marston Moretaine & Poppyhill. These increases in discharge volumes without improvements in water quality have the potential to effect water quality in the receiving watercourses through increased eutrophication. A decrease in water quality may be a risk to sensitive species such as bullhead & spined loach, white-clawed crayfish, & salmonid species (brown trout/sea trout).	The route of proposed Sewer from Marston Vale to Bedford WwTW was not known at the time of this ecological risk assessment although the approximate footprint does run in close proximity to the River Great Ouse creating a potential risk of habitat loss.	River Great Ouse runs through Bromham & West of Kempston development areas. Risk of habitat loss & subsequent risks to otter population. Potton development areas along Millbridge/Common Brooks & subsequent risk to water vole population. The risk of habitat loss & risks to otter & water vole populations would be dependent on whether any channel/bankworks take place as part of the proposed developments.	<u>Flood risk management:</u> Watercourse improvements & in-channel storage may lead to loss of river & bankside habitats & associated fish, invertebrates & water voles. Floods have the potential to displace small fish downstream, especially where there is little refuge & shelter for fish to escape the flows. Flooding along Ouse Valley displaces fish, including large carp, from gravel pits into the main river. Carp mayout-compete the natural riverine species. Sewer capacity: Potential risk of habitat loss. Development footprint: Risk of habitat loss & subsequent risks to associated species e.g. otter & water vole populations.	<u>Flood risk management:</u> There may be localised river restoration opportunities within the development areas such as at Wootton, Land off Cambridge Road & the Wixams development areas. Watercourses may benefit from removal of flood & navigational structures, to return rivers to more natural flows, also allowing unrestricted passage for fish & otters. Waste water treatment: The WFD will impose tighter constraints on the discharge of ammonia & phosphate, resulting in improved receiving water quality. This will help to achieve the WFD objective of good ecological status (via improved chemical status) by 2015. The increase in discharges from WwTW into the River Ivel, River Flit & River Great Ouse has the potential to increase summer flows levels (Upper Ouse & Bedford Ouse CAMS).
	Mammals	**Otter:** River Great Ouse & Backwater; River Ivel/Hiz/Purwell; Marston Brook; Elstow Brook; River Ivel Navigation/Hit/Flit; River Flit/Fancott Brook; Millbridge/Common Brooks	Warren Villas CWS	I	Bern Convention; Habitats Directive; Wildlife & Countryside Act 1981 (as amended); Priority UK BAP Species; LBAP Species								
		Water Shrew: Individual records along River Great Ouse; Elstow Brook; River Ivel/Hiz/Purwell; River Ivel Navigation/Hit/Flit; Fancott Brook/Flit		N	Wildlife & Countryside Act 1981 (as amended)								
		Water vole: main records along River Ivel/Hiz/Purwell (Biggleswade to north past Sandy); Millbridge/Common Brook (Biggleswade to Gemplingay. Individual records: near Renhold; River Great Ouse near Willington & Blunham; Near Ampthill; River Ivel near Arsely; River Ivel/Hiz near Hadwell; Sutton Brook; Elstow Brook.	Duck End Marshy Grassland CWS; Rivers Ivel & Hiz CWS	N	Bern Convention; Habitats Directive; Wildlife & Countryside Act 1981 (as amended); Priority UK BAP Species; LBAP Species								
	Fish	**Bedford Ouse: dominant cyprinid species** such as roach, common bream, silver bream, perch, tench & bleak. In addition, spined loach & bullhead occur in the Ouse.	Flitton Moor CWS; Flitwick Moor CWS; River Flit CWS; River Great Ouse CWS; Rivers Ivel & Hiz CWS	I / R / L	Bern Convention; Habitats Directive; Priority UK BAP Species (sea trout, eel and spined loach only); LBAO species (spined loach only)								
	Invertebrates	**Scarce Chaser dragonfly**: River Great Ouse at Roxton		R	Listed under category 3 (scarce) in the British Red Data Book on Insects								

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Context							Existing public water supply from groundwater, except Clapham supplied from River Great Ouse. Additional resource from Grafham water as needed. No new abstractions proposed; existing licences will be used supplemented from Grafham Water. Pulloxhill reservoir consent is dormant but will be used to support increased demand. Marston Vale: Preliminary Water Cycle Strategy (2008) suggests abstraction of non-potable water from lakes within footprint of Eco-town.	Increased rates & volumes of run-off will be attenuated within development areas except: - **North of Fields Road, Wootton** (creation of offsite Van Dieman's Land lake & watercourse improvement) - **Wixams** (Watercourse improvements & channel diversions) - **Land off Cambridge Road** (In-channel storage upstream of Cardington Cross & compensation within river corridor for land raising in floodplain) - **Kempston Harwick (**use of Kempston Harwick Pits for flood attenuation) - **Land North of Wixams beside B530** (use of Elstow South Lakes for flood attenuation) Marston Vale: Preliminary Water Cycle Strategy (2008) suggested use of lakes within footprint of **Eco-town** for flood alleviation purposes. Information on flood alleviation options for key service centres, some development areas & effect of releasing water from long term storage **not available** for this assessment.	9 WwTWs (Biggleswade, Clifton, Bedford, Clophill, Flitwick, Marston Moritaine, Poppyhill, Potton, Sandy) are most likely to be affected by the proposed growth. Increases in wastewater discharges has the potential to increase river flows & levels. However, waste water discharges will still meet consented water quality standards - therefore no decrease in water quality. There are problems with accommodating additional flows at Marston Mortaine WwTW as a result of the proposed Marston Vale Development. Options include: replacement of Stewartby WwTW, construction of a new WwTW in vicinity of Marston Moretaine & Stewartby, or upgrade Bedford WwTW & construct new sewer.	New sewer from Marston Vale to Bedford WwTW instead of new WwTW in the vicinity of Stewartby & Marston Moretaine. Minor sewer network & recommendations for pipe improvements & new pipes not considered during this assessment as these will be considered at a local level by Anglian Water.			
		White-clawed crayfish: Individual records along River Ivel Navigation / Hit / Flit / Henlow Brook at Clifton; Hexton Brook at Shillington	River Ivel and Hiz CWS	I	Bern Convention; Habitats Directive; Wildlife and Countryside Act 1981 (as amended); Priority UK BAP Species (white clawed crayfish)								
	Birds		Biggleswade Common CWS; Great and Little Early groves CWS; King's Wood, Houghton Conquest CWS; River Flit CWS; River Great Ouse CWS; Rivers Ivel and Hiz CWS; South Mills Pits CWS; Warren Villas CWS; Zwetsloots Pits CWS	N / R / L	Wildlife and Countryside Act 1981 (as amended); UK BAP Priority species (reed bunting only); IUCN Red List species (reed bunting only); IUCN Amber List (mute swan, pochard, redshank, lesser black-backed gull, lapwing)								
	Flora (Black poplar, tasteless water pepper)		River Flit CWS; Flit Valley CWS; River Great Ouse CWS	R									

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Wet Woodland (including wet ash-maple woodland)	Wet Woodland habitat	Scattered distribution. Individual areas located along rivers include River Flit @ Shefford and New Inn Brook at Silsoe	Upper Alders CWS; Buckle Grove CWS	N	Priority UK BAP habitat; LBAP habitat	**Change in hydrology** e.g. reduction in surface, flood or ground water levels. **Decrease in water quality** e.g. contamination. **Flood defence** works with no integrated flood management. **Physical loss of habitat** e.g. from development footprint	Abstraction licences are closely monitored by the Environment Agency and any increased demands on water abstraction from increased development will be managed to ensure the present river or ground water levels will not worsen from the present situation. Water levels are unlikely to change.	Habitat not present within vicinity of the proposed works or watercourse	Increase in flows from increased development and subsequent increase in River Flit and New Inn Brook flows not likely to change hydrology of wet woodland habitat.	Not located within sewer footprint.	Not located within the footprint of any proposed development areas	No residual risks identifiifed	<u>Flood risk management:</u> Flood attenuation as part of the proposed development areas has the potential to provide habitat creation opportunities, including ponds, lakes, wet woodland, ditches, wet grassland, and reedbeds
Marshy grassland (floodplain grazing marsh)	Marshy grassland (floodplain grazing marsh) habitat and marsh habitat	River Great Ouse floodplain; River Ivel/Hiz/Purwell floodplain	Ampthill Park CWS; Arlesey meadows CWS; Austin cannons meadow CWS; Begwary Brook Pits CWS; Brogborough lake CWS; Bromham park CWS; Bromham Water Meadows CWS; Cainhoe Lakes CWS; Cooper's Hill SSSI; Duck End Marshy Grassland CWS; Felmersham Marsh Meadow CWS; Fenlake Meadow CWS; Flitwick Manor CWS; Flitwick Moor SSSI; Foster hill road Cemetery CWS; Harrold Country Park CWS; Henlow Park Wood CWS; Holywell Marsh CWS; Kempston Hardwick Pit CWS; King's Wood, Houghton Conquest CWS; Langford Common CWS; Maulden Church Meadow SSSI; Maulden Woods and Heaths CWS; Millbrook CWS; Millbrook Warren CWS; Newton Park Grassland CWS; Old Warren Disused Railway CWS; Priory Country Park CWS; Pulloxhill Marsh SSSI; Pulloxhill North Marshes CWS; Pulloxhill South Grasslands CWS; Rookery Clay Pit CWS; Sandy Meadow CWS; Sandy Warren SSSI; South Mills Pits CWS; Stevington Marsh CWS; Stevington Marsh SSSI; Stevington Meadow CWS; Stewartby Lakes CWS; Upper Alders CWS; Willington Moat CWS; Wooton Wood CWS; Wyboston Pits CWS; Zwetsloots Pits CWS	N	Priority UK BAP habitat; LBAP habitat	**Change in hydrology** e.g. reduction in ground, surface or flood water levels. **Flood defence** works preventing seasonal flooding. **Physical loss of habitat** e.g. from development footprint. **Disturbance to fauna** e.g. to bird populations.	Increased abstraction from lakes / gravel pits has the potential to lower water levels, creating a risk of loss of locally important and UK BAP Priority marginal habitats such as marshy grassland at Brogborough Lake, Kempston Hardwick Pits and Stewartby Lake.	Marginal habitats such as marshy grassland are already likely to be adapted to seasonal variations in water levels.	Increase in flows from increased development and subsequent increase in River Great Ouse, River Ivel/Hiz/Purwell flows not likely to change hydrology of marshy grassland habitat.	Not located within sewer footprint.	Bromham development boundary encroaches on floodplain grazing marsh habitat of the River Great Ouse within Bromham Water Meadows CWS (subsequent risks to otter population). Biggleswade and Sandy development areas encroach on floodplain grazing marsh habitat of the River Ivel/Hiz/Purwell (subsequent risks to otter, water and grass snake populations). Kempston development area encroaches on floodplain grazing marsh of Elstow Brook. Risk of habitat loss. Although, restrictions on development within floodplain as stated in PPS 25.	<u>Water Resources:</u> Increased abstraction has the potential to lower water levels, creating a risk of loss of locally important and UK BAP Priority marginal habitats such as marshy grassland. <u>Development footprint:</u> Risk of habitat loss and subsequent risks to associated species e.g. otter and water vole populations, and grass snakes.	<u>Flood risk management:</u> Flood attenuation as part of the proposed development areas has the potential to provide habitat creation opportunities, including ponds, lakes, wet woodland, ditches, wet grassland, and reedbeds. <u>Development footprint:</u> Open water and grazing marsh habitats are located within the footprints of the East Ampthill, Broom, Wixham, Henlow, Bromham, east of Kempston, Biggleswade, Sandy and the Eco-town development areas. Careful design of the development areas and the management of water could be used to increase the quality and extent of these habitats.
	Otter	River Great Ouse and Backwater; River Ivel/Hiz/Purwell		I	Bern Convention; Habitats Directive; Wildlife and Countryside Act 1981 (as amended); Priority UK BAP Species; LBAP Species								
	Birds		Begwary Brook Pits CWS; South Mills Pits CWS; Stewartby Lakes CWS; Zwetsloots Pits CWS	N / R / L	Wildlife and Countryside Act 1981 (as amended); Priority UK BAP species (reed bunting only); IUCN Red List species (reed bunting only); IUCN Amber List (mute swan, pochard, willow warbler, edshank, lesser black-backed gull, lapwing)								

	Feature habitat & associated species	Distribution	Protected sites: Site name	Protected sites: Importance: International, European, National, Local *	Related Policies & Legislation	Sensitivity to WCS hazards	Water resources (water abstraction)	Flood risk management	Waste water treatment	Sewer capacity	Development footprint (direct)	Risk	Opportunities
Context							Existing public water supply from groundwater, except Clapham supplied from River Great Ouse. Additional resource from Grafham water as needed. No new abstractions proposed; existing licences will be used supplemented from Grafham Water. Pulloxhill reservoir consent is dormant but will be used to support increased demand. Marston Vale: Preliminary Water Cycle Strategy (2008) suggests abstraction of non-potable water from lakes within footprint of Eco-town.	Increased rates & volumes of run-off will be attenuated within development areas except: - **North of Fields Road, Wootton** (creation of offsite Van Dieman's Land lake & watercourse improvement) - **Wixams** (Watercourse improvements & channel diversions) - **Land off Cambridge Road** (In-channel storage upstream of Cardington Cross & compensation within river corridor for land raising in floodplain) - **Kempston Harwick (**use of Kempston Harwick Pits for flood attenuation) - **Land North of Wixams beside B530** (use of Elstow South Lakes for flood attenuation) Marston Vale: Preliminary Water Cycle Strategy (2008) suggested use of lakes within footprint of **Eco-town** for flood alleviation purposes. Information on flood alleviation options for key service centres, some development areas & effect of releasing water from long term storage **not available** for this assessment.	9 WwTWs (Biggleswade, Clifton, Bedford, Clophill, Flitwick, Marston Moritaine, Poppyhill, Potton, Sandy) are most likely to be affected by the proposed growth. Increases in wastewater discharges has the potential to increase river flows & levels. However, waste water discharges will still meet consented water quality standards - therefore no decrease in water quality. There are problems with accommodating additional flows at Marston Mortaine WwTW as a result of the proposed Marston Vale Development. Options include: replacement of Stewartby WwTW, construction of a new WwTW in vicinity of Marston Moretaine & Stewartby, or upgrade Bedford WwTW & construct new sewer.	New sewer from Marston Vale to Bedford WwTW instead of new WwTW in the vicinity of Stewartby & Marston Moretaine. Minor sewer network & recommendations for pipe improvements & new pipes not considered during this assessment as these will be considered at a local level by Anglian Water.			
Reed bed andswamp	Reed bed and swamp habitat	Individual areas located along River Great Ouse at Sharnbrook and Pavenham; along Fancott Brook at Flitwick; and at Southill	Arlesey meadows CWS; Arlesey Road Pit CWS; Austin cannons meadow CWS; Begwary Brook Pits CWS; Biggleswade Common CWS; Brogborough lake CWS; Coronation Pit CWS; Duck End Marshy Grassland CWS; Elstow pit CWS; Flitwick Manor CWS; Flitwick Moor CWS; Flitwick Moor SSSI; Henlow Park Wood CWS; Kempston Hardwick Pit CWS; Lidlington Pit CWS; Little Barford CWS; Marston Thrift CWS; Mill Rise, Turvey CWS; Millbrook CWS; Millbrook Pillinge Pit CWS; River Flit CWS; River Great Ouse CWS; Sandy Disused Railway CWS; South Mills Pits CWS; Stevington Meadow CWS; Sutton Fen and Woods CWS; Upper Alders CWS, Southilll Lake and Wood CWS; Felmersham Gravel pits SSSI	N	Priority UK BAP habitats; LBAP habitats	**Change in hydrology** e.g. reduction in surface, flood or ground water levels. **Decrease in water quality** e.g. contamination; flood defence works with no integrated flood management. **Excessive flooding** leading to habitat loss. **Physical loss of habitat** e.g. from development footprint.	Increased abstraction from Marston Pit, Brogborough Lake, Kempston Hardwick Pits, Stewartby Lake and Coronation Pit has the potential to lower water levels, creating a risk to fish (such as trout in Stewartby Lake), aquatic invertebrates and plants. There is also the risk of loss of locally important and UK BAP Priority marginal habitats such as reedbed habitat at Brogborough Lake, Kempston Hardwick Pits and Coronation Pit.	Marginal habitats such as reedbeds are already likely to be adapted to seasonal variations in water levels.	Increase in flows from increased development and subsequent increase in River Great Ouse and Fancott Brook flows not likely to change hydrology of reedbed and swamp habitats. Increased flows from the Bedford WwTW may provide opportunities for the creation of reedbeds.	Not located within sewer footprint.	Wixham development area encroaches on swamp habitat within Coronation Pit CWS	<u>Water resources:</u> Increased abstraction has the potential to lower water levels, creating a risk to fish, aquatic invertebrates and plants, and risk of loss of locally important and UK BAP Priority marginal habitats such as reedbed habitat. <u>Flood risk management:</u> Flood attenuation as part of the proposed development areas has the potential to provide habitat creation opportunities, including ponds, lakes, wet woodland, ditches, wet grassland, and reedbeds. <u>Development areas:</u> Wixham development area encroaches on swamp habitat within Coronation Pit CWS	<u>Flood risk management:</u> Flood attenuation as part of the proposed development areas has the potential to provide habitat creation opportunities, including ponds, lakes, wet woodland, ditches, wet grassland, and reedbeds. <u>Waste water treatment:</u> Increased flows from the Bedford WwTW may provide opportunities for the creation of reedbeds. <u>Development area:</u> Open water and grazing marsh habitats are located within the footprints of the East Ampthill, Broom, Wixham, Henlow, Bromham, east of Kempston, Biggleswade, Sandy and the Eco-town development areas. Careful design of the development areas and the management of water could be used to increase the quality and extent of these habitats.
	Birds		South Mills Pits CWS; Begwary Brook Pits CWS	N / R / L	Wildlife and Countryside Act 1981 (as amended); Priority UK BAP species (reed bunting, great bittern); IUCN Red List species (reed bunting and great bittern)								
Ditches	Ditch habitat	Scattered distribution	Begwary Brook Pits CWS; Biggleswade Common CWS; Buckle Grove CWS; Cainhoe Lakes CWS; Duck End Marshy Grassland CWS; Felmersham Marsh Meadow CWS; Flit Valley CWS; Flitwick Manor CWS; Flitwick Moor SSSI; Flitwick Moor CWS; Great and Little Early Groves CWS; Harrold lake CWS; Henlow Park Wood CWS; Kempston Hardwick Pit CWS; King's Wood, Houghton Conquest CWS; Langford Common CWS; Lower Alders CWS; Marston Thrift CWS; Millbrook Warren CWS; Moors Plantation CWS; Odell Great Wood SSSI; Pulloxhill South Grasslands CWS; River Flit CWS; River Great Ouse CWS; River Ivel and Hiz CWS; Salford Wood CWS; Sandy Disused Railway CWS; Sandy Meadow CWS; Sandy Warren SSSI; Stewartby Lakes CWS; Sutton Fen and Woods CWS; Thrift Wood CWS; Tilwick Meadow SSSI; Upper Alders CWS; Warren Villas CWS; Warren Wood CWS; Wavendon Heath Ponds SSSI; Wrest park Grounds CWS	L		**Change in hydrology** e.g. reduction in surface and ground water levels. **Physical loss of habitat** e.g. from development footprint.	Abstraction licencing by the Environment Agency will ensure that river and ground water levels will not be impacted - water levels unlikely to change.	Potential for water quality issues from 'first flush' effect from all developments. Water cycle strategy recommends that all SUDS for all developments are designed to prevent risk of 'first flush' effect.	Waste water not discharged into ditches. Water quality issues unlikely	Unable to determine if ditches under footprint of sewer footprint.	Likely habitat is present within all development areas. Risk of habitat loss	<u>Sewer capacity/development footprint:</u> Potential habitat loss from footprints leading to risks to aquatic invertebrates; amphibians (including great crested newts if present), fish.	<u>Flood risk management:</u> Flood attenuation required on all development sites for 1 in 30yr flood events, possible habitat creation opportunities. Opportunities for habitat enhancement and creation within all development areas through flood attentuation e.g. allowing ditches to be wet rather than dry through SUDS design. <u>Development footprint:</u> The Marston Vale: Preliminary Water Cycle Strategy (2008) proposed the creation of 100ha of wetlands with a mosaic of deep pools, marginal shelves and drier mounds within the Marston Vale Growth area. Water would be passed through a system of ditches, rills and pools and be controlled by simple sluices
Fen	Fen habitat	Individual area located at Flitwick	Flitwick Moor SSSI	N	Priority UK BAP habitat	**Change in hydrology** e.g. reduction in surface, flood or ground water levels. **Physical loss of habitat** e.g. from development footprint.	Abstraction licencing by the Environment Agency will ensure that river and ground water levels will not be impacted - water levels unlikely to change.	Area of fen habitat on River Ise will receive unchanged water flows to present situation.	Increase in flows from increased development and subsequent increase in River Flit flows not likely to change hydrology of habitats	Not located within sewer footprint.	Not located within the footprint of any proposed development areas	No residual risks identififed	No opportunities identified

	Feature habitat & associated species	Distribution	Protected sites: Site name	Protected sites: Importance: International, European, National, Local *	Related Policies & Legislation	Sensitivity to WCS hazards	Water resources (water abstraction)	Flood risk management	Waste water treatment	Sewer capacity	Development footprint (direct)	Risk	Opportunities
Context							Existing public water supply from groundwater, except Clapham supplied from River Great Ouse. Additional resource from Grafham water as needed. No new abstractions proposed; existing licences will be used supplemented from Grafham Water. Pulloxhill reservoir consent is dormant but will be used to support increased demand. Marston Vale: Preliminary Water Cycle Strategy (2008) suggests abstraction of non-potable water from lakes within footprint of Eco-town.	Increased rates & volumes of run-off will be attenuated within development areas except: - **North of Fields Road, Wootton** (creation of offsite Van Dieman's Land lake & watercourse improvement) - **Wixams** (Watercourse improvements & channel diversions) - **Land off Cambridge Road** (In-channel storage upstream of Cardington Cross & compensation within river corridor for land raising in floodplain) - **Kempston Harwick (**use of Kempston Harwick Pits for flood attenuation) - **Land North of Wixams beside B530** (use of Elstow South Lakes for flood attenuation) Marston Vale: Preliminary Water Cycle Strategy (2008) suggested use of lakes within footprint of **Eco-town** for flood alleviation purposes. Information on flood alleviation options for key service centres, some development areas & effect of releasing water from long term storage **not available** for this assessment.	9 WwTWs (Biggleswade, Clifton, Bedford, Clophill, Flitwick, Marston Moritaine, Poppyhill, Potton, Sandy) are most likely to be affected by the proposed growth. Increases in wastewater discharges has the potential to increase river flows & levels. However, waste water discharges will still meet consented water quality standards - therefore no decrease in water quality. There are problems with accommodating additional flows at Marston Mortaine WwTW as a result of the proposed Marston Vale Development. Options include: replacement of Stewartby WwTW, construction of a new WwTW in vicinity of Marston Moretaine & Stewartby, or upgrade Bedford WwTW & construct new sewer.	New sewer from Marston Vale to Bedford WwTW instead of new WwTW in the vicinity of Stewartby & Marston Moretaine. Minor sewer network & recommendations for pipe improvements & new pipes not considered during this assessment as these will be considered at a local level by Anglian Water.			
Ponds	Pond habitat	Scattered distribution	Ampthill Park CWS; Arlesey meadows CWS ;Begwary Brook Pits CWS; Braystone CWS; Bunkers Hill CWS; Cainhoe Lakes CWS; Cranfield Manor Farm Meadows CWS; Duck End Marshy Grassland CWS; Flit Valley CWS; Flitwick Manor CWS; Flitwick Moor CWS; Harlington Villiage Pond CWS; Heydon Hill CWS; Holcot Wood CWS; Kempston West End CWS; Kings Wood and Glebe Meadows, Houghton Conquest SSSI; King's Wood, Houghton Conquest CWS; Lord's Wood CWS; Maulden Church Meadow SSSI; Maulden Wood and Pennyfather's Hill SSSI; Millbrook Warren CWS; Newton Park Grassland CWS; Old Warren Disused Railway CWS; Pateman's Wood CWS; Potton Wood SSSI; Priory Country Park CWS; Pulloxhill North Marshes CWS; River Flit CWS; River Ivel and Hiz CWS; Sandy Warren SSSI; Silsoe Pit CWS; Stanford Plantation CWS; Stewartby Lakes CWS; Sutton Fen and Woods CWS; Tilwick Meadow SSSI; Upper Alders CWS; Warren Villas CWS; Wavendon Heath Ponds SSSI.	N	Prioirity UK BAP habitat; LBAP habitat	**Change in hydrology** e.g. reduction in surface, flood or ground water levels. **Decrease in water quality** e.g. nutrient enrichment, change in water chemistry, contamination. **Physical loss of habitat** e.g. from development footprint.	Abstraction licencing by the Environment Agency will ensure that river and ground water levels will not be impacted - water levels unlikely to change.	Potential for water quality issues from 'first flush' effect from all developments. Water cycle strategy recommends that all SUDS for all developments are designed to prevent risk of 'first flush' effect.	Waste water not discharged into ponds. Water quality issues unlikely	Unable to determine if ponds under footprint of sewer footprint.	Ponds not mapped so could be present on all development areas. Risk of habitat loss.	<u>Sewer capacity/development footprint:</u> Potential habitat loss from footprints leading to risks to aquatic invertebrates; amphibians (inc great crested newts if present), fish.	<u>Flood risk management:</u> Flood attenuation required on all development sites for 1 in 30yr flood events, possible habitat creation opportunities. Opportunities for habitat enhancement and creation within all development areas through flood attenuation e.g. allowing ditches to be wet rather than dry through SUDS design. <u>Waste water treatment:</u> The potential for improvements in water quality through the introduction of the Water Framework Directive standards which may increase habitat extents and species distribution <u>Development footprints:</u> Terrestrial and aquatic habitat restoration and/or creation e.g. ponds. Opportunities for habitat enhancement and creation within all development areas e.g. through SUDS design.
	Great crested newt	Scattered distribution, likely to be correlated to ponds	Willington Moat CWS; Ampthill Park CWS; Bromham Lake LNR; Cleat Hill CWS; Maulden Woods and Heaths CWS; Maulden Church Meadow SSSI; Braystone CWS	I	Habitats Directive, Wildlife and Countryside Act 1981 (as amended), Bern Convention; Priority UK BAP species; LBAP species								
	Natterjack toad	Sandy Lodge, Sandy	Sandy Warren CWS	I	Habitats Directive, Wildlife and Countryside Act 1981 (as amended), Bern Convention;Annex IV of the EC Habitats Directive; Priority UK BAP species								
	Other amphibians	Scattered distribution, likely to be correlated to ponds	Upper Alders CWS; Duck End Marshy Grassland CWS; Priory Country Park CWS; Ampthill Park CWS; Upper Alders CWS; Maulden Church Meadow SSSI; Flitwick Moor CWS; Warren Villas CWS	L	UK BAP species								
Purple Moor Rush Grassland and Rush Pastures	Purple Moor Rush Grassland and Rush Pastures habitat	Individual area located at Pulloxhill	Pulloxhill Marsh SSSI	N	UK BAP Priority habitat		Abstraction licencing by the Environment Agency will ensure that river and ground water levels will not be impacted - water levels unlikely to change.	Area of purple moor rush grassland will remain unchanged to present situation.	Increase in flows from increased development and subsequent increase in the flow of the River Flit are not likely to change the hydrology of habitats	Not located within sewer footprint.	Not located within the footprint of any proposed development areas	No residual risks identifiifed	No opportunities identified

Key

I	International Importance
N	National Importance
R	Regional Importance
L	Local Importance

* National BAP Priority habitats and species have been allocated National Importance subject to more detailed investigation into geographical frame of reference