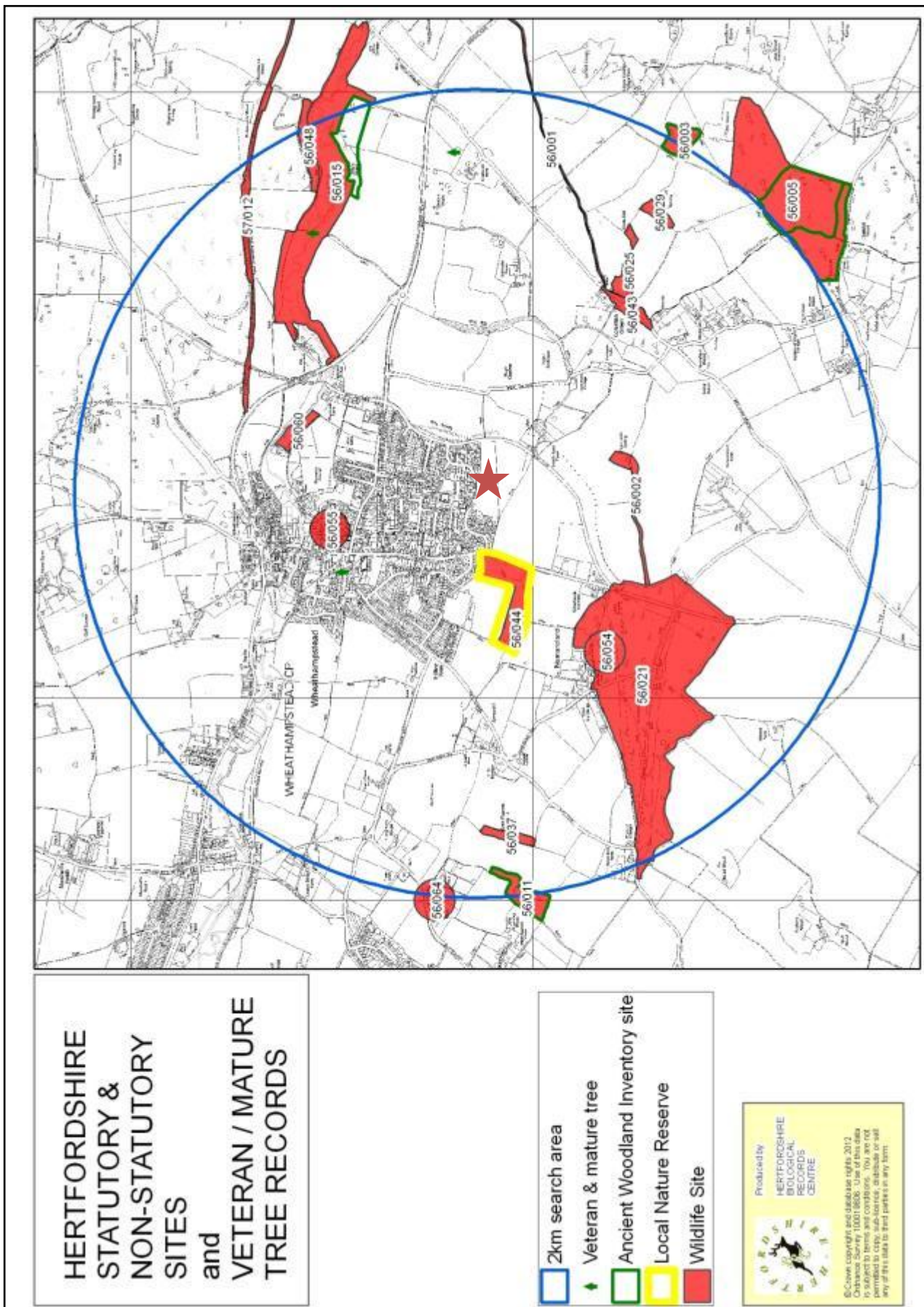


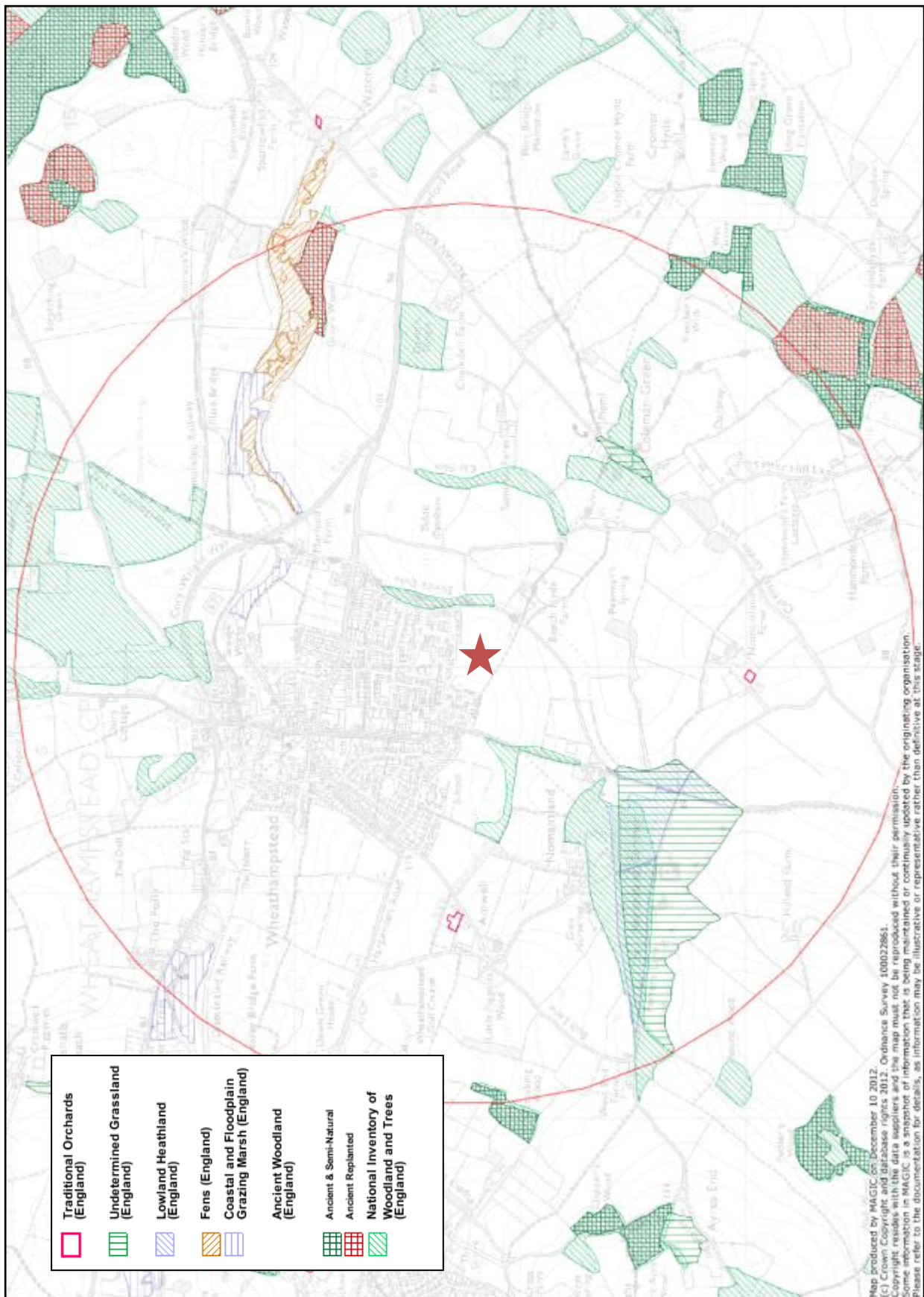
Figure 2: Statutory and non-statutory sites within 2km



Habitat Types within 2km

- 3.3 Habitat types within the area included areas of ancient woodlands and lowland heathland, fens, coastal and floodplain grazing marsh and ancient woodland. Areas of undetermined grassland and traditional orchards are provisionally listed due to a lack of data. The nearest woodland lies adjacent to the eastern boundary of the site, and the nearest ancient woodland approximately 1.8km south east. The nearest area of lowland heathland lies approximately 750m to the south west of the site, in Wheathampstead Local Nature Reserve. The nearest area of floodplain grazing marsh lies approximately 1km to the north of the site.

Figure 3: Habitat types within 2km



Protected, BAP and Rare Species

- 3.4 The Birds of Conservation Concern (BoCC) are split into three criteria. The red list is the highest conservation priority (species needing urgent action). The amber list is the next most critical group, followed by green. Red listed species are those that are globally threatened according to IUCN criteria, species with populations or ranges that have declined rapidly in recent years, and those that have declined historically and have not shown a substantial recent recovery.
- 3.5 Full lists of UK BAP and protected amphibians, reptiles, flora, invertebrates and mammals are shown below. A reduced list of UK BAP and protected birds, is shown; these have been selected based on their likelihood of being recorded at the site given the habitats types present.

Birds	Protection	Approximate distance from site	Year of Record
Skylark	BoCC red list, UK BAP	Within an adjacent 1km square to the south west	2010
Common linnet	BoCC red list, UK BAP	1.9km north east	2001
Cuckoo	BoCC red list, UK BAP	1.9km north east	2003
Yellowhammer	BoCC red list, UK BAP	0.9 north west	2003
Spotted flycatcher	BoCC red list, UK BAP	0.9 north west	2003
Grey partridge	BoCC red list, UK BAP	0.9 north west	2003
Redwing	BoCC red list, WCA Schedule 1	1.9km north east	2003
Fieldfare	BoCC red list, WCA Schedule 1	1.9km north east	2003
Lapwing	BoCC red list, UK BAP	1.9km north east	2003

Plants	British Red Data List Category	Approximate distance from site	Year of Record
Cornflower (<i>Centaurea cyanus</i>)	Least concern*	0.6km west	1999
Common cudweed (<i>Filago vulgaris</i>)	Near threatened	1.4km north east	2002

Corn marigold (<i>Glebionis segetum</i>)	Vulnerable	500m west	1999
Common rock-rose (<i>Helianthemum nummularium</i>)	Least concern	1.1km south west	2005
Bluebell (<i>Hyacinthoides non-scripta</i>)	Least concern	1km south east	2004
Juniper (<i>Juniperus communis</i>)	Least concern	2km north west	1999
Whorled water-milfoil (<i>Myriophyllum verticillatum</i>)	Vulnerable	0.9km north	2003
Prickly poppy (<i>Papaver argemone</i>)	Vulnerable	1.9km south west	1989
Shepherd's-needle (<i>Scandix pecten-veneris</i>)	Critically endangered	1.8km south west	1991
Dwarf gorse (<i>Ulex minor</i>)	Least concern	1.3km south west	2005

* The re-classification from 'endangered' is largely due to the difficulty in distinguishing between long-lived 'natural' occurrences and recent introductions. It is thought that the smaller scatter in 'natural' populations remains at high risk of extinction in the wild. http://www.plantlife.org.uk/wild_plants/plant_species/cornflower/

Mammals	Protection	Approximate distance from site	Year of Record
Badger	Protection of Badgers Act 1992	Within the same 2km square as the site	1985
Brown hare	UKBAP	Within an adjacent 2km square to the west and south west	1985
Brown long-eared bat	European protected, UKBAP	Within an adjacent 1km square to the north west	2006
Daubenton's bat	European protected	Within an adjacent 1km square to the north east	1999
Harvest mouse	UKBAP	Within an adjacent 2km square to the north west and south west	1985
Hazel dormouse	European protected, UKBAP, LBAP	Within an adjacent 2km square to the west	1985
Hedgehog	UKBAP	Within four adjacent 2km squares	1985
Natterer's bat	European protected, LBAP	Within an adjacent 1km square to the south west	2001

Common pipistrelle	European protected	Within an adjacent 1km square to the south west	2003
Soprano pipistrelle	European protected, UKBAP	Within an adjacent 1km square to the south west	2003
Water vole	WCA Schedule 5, UKBAP and LBAP	1km north west	2003

Invertebrates	Protection	Approximate distance from site	Year of Record
Small heath	UKBAP	1km SW	2010
		200m S	2003
White-letter hairstreak	UKBAP	0.6km west	2006
61 BAP moth species have been recorded in the wider area			

Reptiles	Protection	Approximate distance from site	Year of Record
Common lizard	Partially protected under the WCA Schedule 5, UKBAP	1.2km south west	2005
Slow worm	Partially protected under the WCA Schedule 5, UKBAP	Within an adjacent 1km square to the east	1986

WCA = Wildlife and Countryside Act 1981 as amended; UK BAP = UK Biodiversity Action Plan;
LBAP = Local Biodiversity Action Plan; BoCC = Birds of Conservation Concern

Phase 1 Habitat Survey

- 3.6 Appendix A shows a Phase 1 habitat map of the site, with Target Notes. A list of plant species identified on the site is included in Appendix B.




Limitations and Assumptions




- 3.7 The baseline conditions reported and assessed in this document represent those identified at the time of the survey on the 5th December 2012. Although a reasonable assessment of habitats present can be made during a single walkover survey, seasonal variations are not observed. The full plant species list (Appendix B) was based on the current site visit. The survey was conducted in December, which is





outside the optimal season for Phase 1 habitat surveys. All areas of the site were accessible on the day of the survey. However, snow on the arable part of the site limited visibility of the cropped area, though this was not considered a constraint as the survey was undertaken at a sub-optimal time of year for identifying arable flora and will be re-visited at a more appropriate time




The desk study used available records and historical data from the local area. However, this does not provide a reliable indication of species present since records depend entirely on survey effort in the area, which is highly variable. The data are useful as a general guide to supplement the site visit, but absence of records does not reflect absence of species.




Target Notes




Target Note	Habitat Description	Photo
1	<p>An arable field had been recently cultivated, and as a result no weed species were evident. A volunteer crop of broadleaved plants, likely <i>Brassica</i>, had started to grow. Narrow grassland margins (up to 1m wide), surrounded the field.</p>	
2	<p>A hedge line bordering the northern boundary of the site adjacent to Hill Dyke Road, with occasional mature standard trees. There was a bank on one side of the hedgerow leading down to the adjacent road. Species included oak (<i>Quercus robur</i>), elder (<i>Sambucus nigra</i>), hawthorn (<i>Crataegus monogyna</i>) and hazel (<i>Corylus avellana</i>). Ground flora included cow parsley (<i>Anthriscus sylvestris</i>), common mallow (<i>Malva sylvestris</i>) and cleavers (<i>Galium aparine</i>). The hedge was unmanaged, between three and six meters tall, 2 meters wide and 170 meters long.</p>	
3	<p>A number of ivy clad oak trees within the northern boundary hedge line with splits in branches and aerial deadwood. These were considered to have high potential to support roosting bats.</p>	



<p>4</p>	<p>A hornbeam (<i>Carpinus betulus</i>) within the northern boundary hedge with aerial dead wood, ivy and epicormic growth. This tree was considered to have medium bat roost potential.</p>	
<p>5</p>	<p>An outgrown hedge bordering the western boundary of the site with occasional semi mature and mature standards. Tree species present included ash (<i>Fraxinus excelsior</i>), field maple (<i>Acer campestre</i>) and hazel. A dense understory of scrub was present, species present included bramble (<i>Rubus fruticosus</i>) and rose (<i>rosa sp.</i>) The hedge was unmanaged, approximately three to six meters tall, three to four meters wide and 130 meters long.</p>	
<p>6</p>	<p>An ash tree within the western boundary hedge which was heavily ivy clad. Due to fissuring bark and aerial deadwood, it was considered to have high bat roosting potential.</p>	

<p>7</p>	<p>Pile of garden debris by the western boundary hedge, potentially suitable for hibernating reptiles.</p>	
<p>8</p>	<p>Pile of dead wood by the western boundary hedge, potentially suitable for hibernating reptiles.</p>	
<p>9</p>	<p>Rubble pile beside the western boundary hedge, potentially suitable for hibernating reptiles.</p>	
<p>10</p>	<p>Ivy clad ash tree in the south western corner of the site, which was considered to have medium bat roosting potential.</p>	

<p>11</p>	<p>A row of semi-mature trees on the southern boundary of the site, on a small raised grassy bank, five to seven metres wide. Species included ash, oak and beech (<i>Fagus sylvatica</i>).</p>	
<p>12</p>	<p>A hedge line along the eastern boundary of the site running adjacent to a footpath and dyke lane. Species included oak, elm (<i>Ulmus sp.</i>) and field maple. The hedge was unmanaged, approximately six meters tall, three to four meters wide and 75 meters long.</p>	
<p>13</p>	<p>Oak tree on the north eastern boundary corner, with ivy covering and aerial dead wood. This tree was considered to have medium bat roost potential.</p>	

<p>14</p>	<p>Hedge line bordering the northern boundary of the site adjacent to residential properties off Davys close. Species included oak, elm and field maple. The hedge was unmanaged, approximately three to four meters tall, two meters wide and 150 meters long.</p>	
<p>15</p>	<p>Oak in northern boundary hedge, with aerial deadwood and some ivy covering. This tree was considered to have medium potential to support roosting bats.</p>	
<p>16</p>	<p>Ivy covered, dead tree in northern boundary hedge, with medium bat roost potential.</p>	

<p>17</p>	<p>Dead wood pile by northern boundary hedge, suitable for hibernating reptiles.</p>	
<p>18</p>	<p>A section of hedge on the northern boundary of the site, where cypress has been grown adjacent to residential properties of Davys close.</p>	
<p>19</p>	<p>Ivy clad ash tree on northern boundary hedge with fissures in the bark. This tree was considered to have medium to high bat roost potential.</p>	

<p>20</p>	<p>Garden waste pile along the northern boundary hedge, adjacent to Hill Dyke Road.</p>	
<p>21</p>	<p>Ash tree at the corner of the northern hedgerow, adjacent to Hill Dyke Lane, of medium bat roosting potential due to fissures in the bark</p>	

4 Protected Species – Results and Evaluation

Flora and habitats

- 4.1 The majority of the site was a cultivated arable field, currently supporting a volunteer crop of broadleaved plants. Narrow field margins, less than 1m wide, surrounded the field and were of low floristic diversity (likely due to herbicide drift) and dominated by coarse grasses and ruderal weeds including false oat grass (*Arrhenatherum elatius*) and cow parsley. It was considered unlikely that any of the rare arable species listed in the data search would be present within the site.
- 4.2 Mature hedgerows bounded the site to the north, east and west. These were species rich and contained a number of species including holly, hawthorn, elm, hazel, hornbeam, oak, blackthorn, rose, field maple and elder. Due to the continuity of the hedgerows and number of woody species present it is considered likely that the hedgerows at the site boundaries would be classified as 'important' under the Hedgerow Regulations 1997. It is recommended that hedgerows are retained within the proposals where possible. If any hedgerows are scheduled for removal, a full hedgerow survey at the appropriate time of year (April to September) should be carried out.
- 4.3 No rare, BAP or protected plant species were recorded at the site during the survey.
- 4.4 The desk study highlighted records of five arable species. Other plant species noted in the desk study were woodland, calcareous grassland and aquatic species which would not be found in habitats such as those within the site boundary.
- 4.5 An arable weed survey of the cultivated part of the site should be carried out between the end of April and the end of June or before ploughing. Timings will be dependent on the crop being planted next year.

Bats

- 4.6 There were a number of mature trees with bat roost potential along the hedges bordering the site (Target Notes 3, 4, 6, 10, 13, 15, 16 and 19) which were considered to provide moderate or high roosting opportunities for bats (Category 2b or 1). Aerial dead wood, fissures in bark and ivy cladding provided numerous crevice roosting opportunities for bats. Several other mature trees were present in the northern boundary hedge in Target Note 2. There were no other suitable trees or buildings within the site.
- 4.7 The site was dominated by arable land, which provides poor quality foraging habitat for bats. The woodland area to the east (beyond the site boundary) provided good quality foraging habitat for bats. Hedgerows along the site boundaries provided suitable commuting routes.

If the development can be confined to the arable land (without impacting the hedgerows/ trees or woodland boundary) it was considered unlikely that bats, if present in the local area, would be significantly impacted by the proposed development. However, to minimise the risk of disturbance to foraging and commuting bats on the site, that the development should follow lighting minimisation precautions, including the following:

- no works on site should be conducted after sunset and if security lighting is required then this should be kept to the minimal level (as necessary for safety and security);
- post development lighting should be directed away from boundary trees and hedgerows;
- installation of lighting columns at the lowest practical height level with box shield fittings will minimise glare and light spillage;
- lux level of lamps should be as low possible and be high pressure sodium (rather than metal halide, or other) with covers made from glass rather than plastic as this minimises the amount of UV light, reducing the attraction effects of lights on insects;
- security lights should be set on short timers, and be sensitive to large moving objects only.

- 4.8 Further survey is recommended if the mature trees identified with bat roosting potential will be impacted by the proposed development. These surveys should follow BCT best practice guidelines (2012), and can be carried out between May and September. Outside this season, it may be possible for a bat-licensed tree-climber to assess the roost status of the trees.

Reptiles

- 4.9 The majority of the site (arable land) provided poor quality habitat for reptiles. Narrow margins around the field provided opportunities for basking and foraging reptiles and piles of dead wood and rubble within the hedgerows at the site boundaries provided potential hibernacula.
- 4.10 The data search provided records of common lizard from 2005 approximately 1.2km to the south west and records of slow worms from 1986, within an adjacent 1km square.
- 4.11 If the majority of the grass margins and hedgerows are retained within the proposals, it was considered that disturbance to reptiles would be minimal.
- 4.12 Due to the small extent of suitable reptile habitat, further surveys are not considered necessary. However, if small areas of the narrow grass margins which border the field are impacted, then precautionary clearance is recommended to prevent harm to widespread reptiles which could potentially be using these areas. This should be carried out following a method statement which is likely to include the following methods:
- *Sequential strimming of vegetation to a height of 5cm above ground level (care should be taken not to allow the blade/trimmer wire to make contact with the ground).*
 - *Strimming should be carried out towards the boundaries of the site, to encourage any reptiles that may be present to move into appropriate surrounding habitat.*
 - *Once strimming is completed the vegetation should be managed in such a way so as to ensure it remains unsuitable for re-colonisation by reptiles, or an exclusion fence erected.*

- *These works should be carried out by, or under the supervision of, an ecologist.*
- *Works must be carried out when reptiles are active (between March and October depending on weather conditions).*

Birds

- 4.13 Trees and hedgerows surrounding the site provided potential nesting and foraging opportunities for birds. The arable crop could provide shelter and nesting opportunities for ground nesting birds such as skylark and grey partridge. Habitats within the site such as arable fields and scattered boundary trees are abundant locally. Therefore, it was considered unlikely that protected, BAP or rare birds would be significantly impacted by the proposed development.
- 4.14 Bird species observed during the field survey included blackbird, wood pigeon, jay, carrion crow, great tit, robin, blue tit, dunnock, (UK BAP species), and house sparrow (BoCC red listed and UK BAP species).
- 4.15 All trees and hedgerows proposed for retention should be suitably protected from harm during the construction works following British Standard: BS5837.
- 4.16 Site clearance and works proposed to any trees or hedgerows should be conducted outside the main bird breeding season (which is end of February until September). If vegetation removal is necessary between these dates, an ecologist should survey the site for active bird nests immediately prior to works. If nests are identified, there may be a delay in the clearance of some vegetation until all young birds have fledged.

Amphibians

- 4.17 A single pond was present within 500m of the site boundary (approximately 310m south west). This pond was in a grazed field and held minimal water. Only non-aquatic vegetation was present, suggesting infrequent inundation. Other ponds (outside 500m from the site) were further to the west, away from the site. A Habitat Suitability Index (HSI) value of 0.59 indicated that the pond was of below average suitability for breeding great crested newts.

	Field Score	SI Value
Location	A	1
Pond Area	50	0.05
Pond Drying	Sometimes	0.5
Water Quality	Moderate-good	0.84
Shade (%)	0%	1
Waterfowl	Absent	1
Fish	Absent	1
Number of Ponds	3	0.92
Terrestrial Habitat	Moderate-good	0.84
Macrophytes	0%	0.3
HSI Score		0.59
Suitability to support breeding great crested newts		Below average

- 4.18 The site itself generally comprised poor quality habitat for amphibians, such as toads and great crested newts, during their terrestrial phase. However, hedgerows and tree lines provided potential dispersal routes for these species.
- 4.19 There were no records of great crested newts within 2km of the site.
- 4.20 There are several ponds to the south east of the surveyed pond which could also provide breeding habitat for great crested newts, whereas no ponds are located to the north and east of the site. As a result it is considered that any dispersing newts would move between the surveyed pond and those to the south east rather than crossing the site. Furthermore, given the poor quality of the terrestrial habitat within the site and the below average suitability of the single pond within 500m, it was considered unlikely that amphibians would be present within the site, or would be impacted by the development. Therefore, further survey is not necessary.

Invertebrates

- 4.21 The arable field was unlikely to support a large number of invertebrates due to the likely use of insecticides. The hedgerows and coarse grassland margins provided potential habitat for common invertebrates. These habitats were of limited floral diversity and extent and therefore unlikely to support a significant assemblage of BAP or rare invertebrates. Dead wood piles provided potential habitat for invertebrates such as stag beetle (a UK and local BAP species) which has a scattered distribution throughout Hertfordshire.

- 4.22 There were no streams on site, therefore, white clawed crayfish were not a consideration.
- 4.23 The data search highlighted records of the small heath, white admiral and white-letter hairstreak butterflies (BAP species) within 2km of the site. Plants such as bramble, which provide nectaring opportunities for small heath and white-letter hairstreak butterflies were present. Areas of bare ground, provided basking opportunities. However, due to the abundance of similar habitats within the surrounding area, it was not considered that the local conservation status of invertebrates would be significantly affected by the proposed development.
- 4.24 Habitats within the site were not considered of suitable structure or diversity to support a significant assemblage of BAP, rare or protected invertebrates. No further survey is necessary.

Hedgehogs, hares and badgers

- 4.25 No signs of badger or hedgehog activity were recorded on the site, grass margins and hedgerows provided moderate quality foraging habitat for both species. The woodland adjacent to Dyke Hill Road provided potential sett creation habitat adjacent to the site, however, no evidence of recent badger activity was found.
- 4.26 The site provided suitable habitat for brown hares, and is connected to further suitable arable habitats to the south and east. Brown hares can be adversely impacted by habitat fragmentation. However, due to the location of the site, which is on the edge of residential areas, the development will not divide areas of suitable habitat.
- 4.27 There are records of hedgehogs, hares and badgers from within 2km of the site; however, these are over 20 years old.
- 4.28 If the developed area can be confined to the arable field (not impacting on the hedgerows or grass margins) it was considered unlikely that badgers or hedgehogs would be impacted by the development. However, due to the presence of suitable habitat within 30m of the site boundary, it is recommended that a checking survey of these areas is carried out just prior to the commencement of works to ensure that badgers have not colonised in the interim. As a further precaution it is also recommended that excavations are covered overnight to prevent animals falling in, or that escape ramps are provided (eg. secured scaffolding boards) allowing animals to climb out.

Dormice

- 4.29 The hedgerows which form the northern, eastern and western site boundaries are suitable for dormice, containing the diversity of species to support dormice throughout their active season. Woodlands outside the site boundary (adjacent to Dyke Hill Road) provided potentially suitable habitat for dormice with a mature canopy structure, and a dense shrub layer. These are connected to hedgerows within the site at the eastern boundary.
- 4.30 There are records for dormice from 1985, within a 1km square, 2km south east of the site.
- 4.31 Due to the historic presence of dormice within the surrounding landscape, and the presence of suitable habitat within and adjacent to the site, if any of the hedgerows are to be removed or impacted by the proposals it is recommended that further surveys are undertaken to assess the presence or likely absence of dormice. If hedgerows are not impacted and a buffer of 10m can be left so that they are not impacted by development or construction then further survey may not be necessary.

Other Protected, BAP or Rare Species

- 4.32 There were no water courses within the site or within 50m of the site boundary. It was considered unlikely that species such as otter, water vole or white clawed crayfish would be impacted by the proposed development.

5 Key Recommendations, Further Surveys and Precautionary Methods

- 5.1. Further surveys of mature trees for bats, as detailed in Section 4 may be required depending on the scope of the development.
- 5.2. If any of the hedgerows at the site boundary are to be impacted by the proposals, it is recommended that a full hedgerow survey and dormouse surveys are undertaken.
- 5.3. It is recommended that precautionary clearance of any grass margins impacted by the creation of a proposed access route is carried out as detailed in Section 4, in order to avoid harm to reptiles.
- 5.4. It is recommended that a checking survey for badger setts is carried out in any areas of suitable habitat within 30m of the site boundary prior to the start of works.

- 5.5. Due to snow covering it is recommended that a full floristic survey of the cropped area is undertaken between the end of April and the end of June to determine whether arable weed species are present.
- 5.6. If works can be confined to the arable part of the site (with no impact on the hedgerows or mature trees) it was considered that impacts on local flora and fauna would be negligible and the site could be enhanced for wildlife if some of the following recommendations are implemented:

6 Additional Recommendations

- 6.1 The following are suggestions that will enhance the value of the site for wildlife. However, it should be noted that these suggestions are not legally required for compensation of habitats or mitigation, but may be revised depending on the outcome of the further surveys for bats and dormice. At least a third of these additional recommendations will need to be implemented to maximize credits under Eco2 of the Code for Sustainable Homes.
- 6.2 Dead wood within the boundary hedgerows of the site could be retained as hibernacula as this provides a valuable resource for insects, such as stag beetles (a local and UK BAP priority species), within the area.
- 6.3 It is recommended that the landscaping for the site incorporates areas of wildflower grassland planting. This will provide suitable habitat for reptiles and increase the numbers of invertebrates and small mammals that the site can support which in turn will benefit bats and birds in the area.
- 6.4 Eight bat boxes should be erected on mature trees at the site boundary to provide additional roosting opportunities for bats in the local area. It is recommended that boxes such as Schwegler 2F and 2FN (or another manufacturer's alternative) are used. These are suitable for bat species recorded in the area, such as pipistrelle and Natterer's bats. Bat boxes should ideally be located south facing (positioned south east to south west) and at least 5m above ground level.
- 6.5 Six standard bird boxes with a variety of shaped and different sized entrance holes will attract a greater diversity of birds to nest. Boxes suitable for starlings (Schwegler 3SV) or spotted flycatcher (Schwegler 2H) would be suitable for this site. Boxes should be located appropriately, out of direct sunlight and close to vegetation.

- 6.6 New houses could be enhanced for birds that utilise buildings for nesting purposes by installing bird nesting boxes, e.g. installation of swift (*Apus apus*) and house martin (*Delichon urbica*) boxes under eaves. Consideration could also be given to providing nest terraces for house sparrows (*Passer domesticus*) a red listed species recorded locally. Sparrow terraces can be placed on sheds or outbuildings close to areas of vegetation.
- 6.7 Native and/or wildlife attracting tree and shrub planting should be included in the landscape design. This would enhance the area for birds, invertebrates and other wildlife in the long-term. Trees and shrubs should be planted to encourage movement, enhancing the existing connections associated with the site.

7 Conclusion

- 7.1 The majority of the site (an arable field) was of low ecological value. Hedgerows containing mature trees to the north, east and western boundaries of the site provided potential habitat for dormice, bats and nesting birds.
- 7.2 If any of the trees or hedgerows to the site boundary are to be impacted, it is recommended that bat and dormouse surveys are carried out.
- 7.3 Precautionary clearance of grass margins is recommended to avoid causing harm to reptiles. Timing clearance of hedgerows or trees to avoid the main nesting bird season is also recommended.
- 7.4 Due to the presence of adjacent habitat with the potential for badger sett creation, it is recommended that a checking survey of suitable areas within 30m of the site boundary is carried out prior to the commencement of works.
- 7.5 If any mitigation or compensation recommended following these further surveys is carried out, and if the precautionary measures detailed in this report are followed, it was considered that the development could proceed with minimal impact on the local conservation status of any protected, BAP or rare species within the area.
- 7.6 It is also considered that with a sensitive landscape scheme, and by including some, or all, of the additional recommendations, the site could be enhanced for local wildlife post development.

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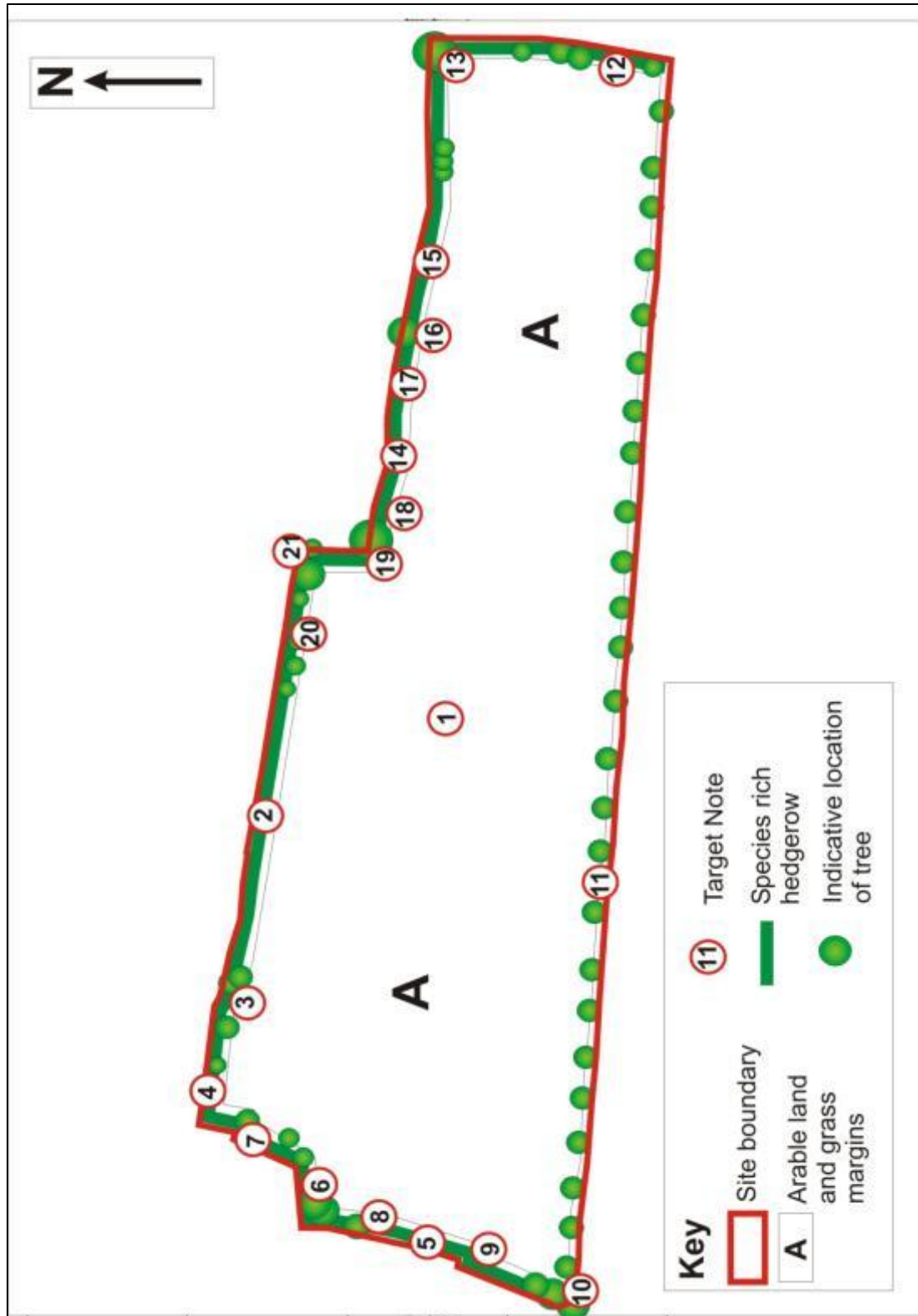
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UK BAP www.ukbap.org.uk

Hertfordshire Local BAP http://www.hef.org.uk/nature/biodiversity_vision

9 Appendices

Appendix A: Phase 1 habitat map



Appendix B: Plant species list**Forbs**

Common Name	Scientific Name	Field Margin	Hedgerow
Cow parsley	<i>Anthriscus sylvestris</i>	✓	✓
Cleavers	<i>Galium aparine</i>	✓	✓
Round leaved crane's bill	<i>Geranium rotundifolium</i>	✓	
Hogweed	<i>Heracleum sphondylium</i>	✓	
Common mallow	<i>Malva sylvestris</i>	✓	✓
Broad-leaved dock	<i>Rumex obtusifolius</i>	✓	
Comfrey	<i>Symphytum officinale</i>	✓	
Dandelion	<i>Taraxacum agg.</i>	✓	
Common nettle	<i>Urtica dioica</i>	✓	

Trees and shrubs

Common Name	Scientific Name	Field Margin	Hedgerow
Field maple	<i>Acer campestre</i>		✓
Horse chestnut	<i>Aesculus hippocastanum</i>		✓
Hornbeam	<i>Carpinus betulus</i>		✓
Hazel	<i>Corylus avellana</i>		✓
Hawthorn	<i>Crataegus monogyna</i>		✓
Ash	<i>Fraxinus excelsior</i>		✓
Ivy	<i>Hedera helix</i>		✓
Holly	<i>Ilex aquifolium</i>		✓
Cherry	<i>Prunus sp</i>		✓
Blackthorn	<i>Prunus spinosa</i>		✓
Oak	<i>Quercus robur</i>		✓
Dog rose	<i>Rosa canina</i>		✓
Bramble	<i>Rubus fruticosus agg.</i>		✓
Elder	<i>Sambucus nigra</i>		✓

Grasses, sedges, rushes and ferns

Common Name	Scientific Name	Field Margin	Hedgerow
Bent	<i>Agrostis sp.</i>	✓	
False oat grass	<i>Arrhenatherum elatius</i>	✓	
Brome	<i>Bromus sp.</i>	✓	
Cocksfoot	<i>Dactylis glomerata</i>	✓	
Couch grass	<i>Elytrigia repens</i>	✓	
Yorkshire fog	<i>Holcus lanatus</i>	✓	

Appendix C: Relevant protected species legislation

Species	Relevant Legislation	Level of Protection
Badgers	<ul style="list-style-type: none"> ○ Protection of Badgers Act 1992 ○ Badgers are also protected by the Wild Mammals (Protection) Act 1996 	<p>The Protection of Badgers Act (1992) makes it an offence to intentionally or recklessly:</p> <ul style="list-style-type: none"> ● Damage a badger sett or any part of it ● Destroy a badger sett ● Obstruct access to, or any entrance of a badger sett ● Disturb a badger whilst it is occupying a badger sett
Bats	<ul style="list-style-type: none"> ○ Full protection under the Wildlife and Countryside Act (WCA) (1981) (Listed on Schedule 5) - as amended ○ Classified as European protected species under Conservation of Habitats and Species Regulations 2010 ○ Also protected by the Wild Mammals (Protection) Act 1996 	<p>Under the WCA (1981), it is an offence to:</p> <ul style="list-style-type: none"> ● intentionally kill, injure, or take any species of bat ● intentionally or recklessly disturb bats ● intentionally or recklessly damage destroy or obstruct access to bat roosts
Birds	<ul style="list-style-type: none"> ○ Protection under the Wildlife and Countryside Act (1981) as amended 	<p>Under the WCA (1981), it is an offence to: (with exceptions for certain species):</p> <ul style="list-style-type: none"> ● Intentionally kill, injure or take any wild bird ● Intentionally take, damage or destroy nests in use or being built (including ground nesting birds) ● Intentionally take, damage or destroy eggs <p>Species listed on Schedule 1 of the WCA or their dependant young are afforded additional protection from disturbance whilst nesting</p>
Dormice	<ul style="list-style-type: none"> ○ Full protection under the Wildlife and Countryside Act (WCA) (1981) (Listed on Schedule 5) - as amended ○ Classified as European protected species under Conservation of Habitats and Species Regulations 2010 	<p>Under the WCA (1981), it is an offence to:</p> <ul style="list-style-type: none"> ● intentionally kill, injure, or take dormice ● intentionally or recklessly disturb dormice ● intentionally or recklessly damage destroy or obstruct access to any place used by the animal for shelter or protection
Widespread Reptiles	<ul style="list-style-type: none"> ○ Partially protected under Schedule 5 of the Wildlife and Countryside Act (1981) as amended. 	<p>Under the WCA (1981), it is an offence to:</p> <ul style="list-style-type: none"> ● intentionally kill or injure these animals ● sell, offer for sale, advertise for sale, possess or transport for the purposes of selling any live or dead animals or part of these animals

Wormald Burrows Partnership Limited
Civil Engineering Consultants

HILL DYKE ROAD
WHEATHAMPSTEAD
FLOOD RISK ASSESSMENT
MAY 2013

LAND SOUTH OF HILL DYKE ROAD, WHEATHAMPSTEAD

FLOOD RISK ASSESSMENT

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REGISTRATION OF AMENDMENTS

Revision	Date	Amendment Details	Prepared by	Checked by
0	03.05.13	Final	Michael Lowiss	Tom Wilson

EXECUTIVE SUMMARY

Wormald Burrows Partnership Limited has been appointed by Taylor Wimpey UK Ltd to provide an assessment of flood risk for the proposed development of land located South of Hill Dyke Road, Wheathampstead at NGR TL 18059 13230.

This report has been prepared in accordance with the 'National Standards for Sustainable Drainage Systems' (published by Defra December 2011) and the 'Technical Guidance to the National Planning Policy Framework' published by the Department for Communities and Local Government (March 2012).

The proposed development comprises of 100 residential units on a greenfield site located at the southern end of Wheathampstead.

Records have been obtained from third parties, including the Environment Agency and Thames Water, who have provided information relating to existing drainage infrastructure within the vicinity of the site.

This Flood Risk Assessment (FRA) considered all potential forms of flood risk to the development site including:

- Mains Rivers (fluvial flood risk)
 - Post-development surface water runoff
 - Groundwater
 - Public Sewers
 - Highway Runoff
 - Land Drainage
 - Flooding from man-made structures

This site is not considered at risk from these potential flood sources.

The greatest residual flood risk arises from increased post development flows. However, the Drainage Strategy identifies sustainable drainage techniques (SUD's), which once implemented will ensure there will be no increase in flood risk to the site or downstream properties during the 1% per annum return period storm, including a 30% allowance to cater for the predicted effects of climate change.

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APPENDICES

Appendix A	-	Drawing No E3090/01, 'Location Plan'
Appendix B	-	Drawing No E3090/25, 'Topographical Survey'
Appendix C	-	EA Groundwater Mapping: <ul style="list-style-type: none"> - EA map: Groundwater Source Protection Zone - EA map: Groundwater Vulnerability Zone - EA map: Drinking Water Protected areas
Appendix D	-	EA Flood Mapping: <ul style="list-style-type: none"> - EA map: Flooding from Rivers and Sea - EA map: Flooding from Reservoirs
Appendix E	-	Historical Borehole Data
Appendix F	-	Envirocheck Report
Appendix G	-	Thames Water Services Plans
Appendix H	-	Microdrainage Calculations: <ul style="list-style-type: none"> - QBAR calculations - Storage Volume calculations
Appendix I	-	Drawing No CSa/2067/107 rev A, 'Illustrative Masterplan'
Appendix J	-	Drawing No E3090/26, 'Indicative Drainage Areas'

1 INTRODUCTION

- 1.1.1 Wormald Burrows Partnership Limited (WBPL) has been commissioned by Taylor Wimpey UK Ltd to carry out a Flood Risk Assessment for a proposed residential development on land south of Hill Dyke Road, Wheathampstead, Hertfordshire.
- 1.1.2 The site is currently greenfield and comprises of an agricultural field located south of Hill Dyke Road at the south east edge of Wheathampstead. Pre development it is a greenfield site.
- 1.1.3 The information used in this Flood Risk Assessment is based on a review of British Geological Survey (BGS) borehole data, a site specific Envirocheck report and historical site data.

2 EXISTING SITE CONDITIONS

2.1 Site description

- 2.1.1 The site is situated at the south east end of Wheathampstead village within the district of St Albans in the county of Hertfordshire. The village is approximately 5km north of St Albans City.
- 2.1.2 The current use of the site is for agricultural purposes as arable farmland. The site is surrounded by a line of trees that separate it from the rest of the farm to the south.
- 2.1.3 The site is approximately 3.51 ha (8.67 acres) in area.
- 2.1.4 To the north, the site is bordered by Hill Dyke Road and to the east it is bordered by Dyke Lane. To the south is agricultural land and to the west lies existing residential housing (Vale Court and Beech Crescent).
- 2.1.5 A 1:10000 scale location plan is shown in **Appendix A**, which shows the proposed development in relation to Wheathampstead and the surrounding area. A Google image of the proposed site is shown below.

2.2 Topography

2.2.1 A copy of the topographical survey is included in **Appendix B** and show that the site has a high point of approximately 115.96 AOD towards the western boundary. This falls away towards the south eastern corner to a low point of 103.15 AOD, at a gradient of about 1 in 28. From the northern boundary it falls at a shallower gradient to the same low point on the south eastern boundary. There is a section of the site on the north western boundary that slopes towards Hill Dyke Road at a shallow gradient. Between Hill Dyke Road and the site there is a 1 in 2 slope down towards the road.

2.3 Geological ground conditions

2.3.1 Environment Agency (EA) Groundwater mapping is shown in **Appendix C**. From these maps it can be seen that the site is within a Groundwater Source Protection Zone 3 (SPZ) and also within a Major Aquifer Intermediate zone. However, from the 'EA Drinking water protected areas map' the site is shown as being in an area that is probably not at risk for groundwater drinking. To accommodate this the drainage strategy will make use of of pollutant filters and this is discussed in more detail in Section 6.

2.3.2 Historical borehole data, given in **Appendix E**, shows that there is clay overlying chalk within the vicinity of the site. The depths for the differing soil types is not known at present. Based on British Geological survey maps the site is mainly a silty sandy gravelly clay with a lowestoft formation covering a small area of the east of the site. The lowestoft formation comprises of chalky till, sands, gravels, silts and clays. This confirms to an extent what the borehole data is suggesting however, until a comprehensive site investigation is carried out, the exact depths and locations of these soil types is unknown.

2.3.3 An environmental assessment of the site was undertaken in the form of an Envirocheck report. This report is a desk study using existing data to assess whether the site is likely to be contaminated. From the report, shown in **Appendix F**, it can be seen that the site has been in agricultural use since the survey maps began (1879). The site is located on or within 25 metres of unknown filled ground (pond, marsh, river, stream, dock etc). The conclusion of the report suggests that the site would not be designated "contaminated land" within the meaning of Part IIA of the Environmental Protection Act 1990. The report also confirms the findings of the EA mapping, in that the site overlies a Zone 3 (total catchment) of a Source Protection Zone relating to a groundwater abstraction used for public drinking water supply.

2.4 Existing surface water management

- 2.4.1 Existing drainage records have been obtained from Thames Water Utilities Ltd, which indicate that there are no existing public surface water sewers in the immediate vicinity of the site or within the site boundary (**Appendix G**). There are public foul water sewers maintained by Thames Water just to the north of the site, manhole '1310' being the closest. A predevelopment enquiry will be undertaken in order to confirm if there is capacity within Thames Water's existing system.
- 2.4.2 Topographical survey shows that the majority of the site falls towards Dyke Lane from the western boundary at a fairly steep 1 in 28 gradient and thus it can be assumed that any surface water will fall in this direction. As there is no ditch adjacent to Dyke Lane or within the site, surface water will likely either flow over the Lane and into Devil's Dyke on the eastern side of Dyke Lane or south along Dyke Lane. At present the site is surrounded by a line of trees and as the site has no impermeable surfaces, surface water will be intercepted by vegetation and will dissipate through infiltration, evaporation and evapotranspiration. As a result it is only in extreme events that there is likely to be any surface water flowing over Dyke Lane.
- 2.4.3 The existing surface water QBAR was calculated as 1.4l/s using Microdrainage Source Control. Based on this value, the 1 in 100 year surface water runoff rate for the existing site was calculated as 5.1l/s. A copy of the Microdrainage calculations are shown in **Appendix H**.

3 POLICY CONTEXT FOR PROPOSED DEVELOPMENT

3.1 The National Planning Policy Framework (NPPF)

- 3.1.1 The EA's flood mapping shows the site is located within an area having less than 1 in 1000 annual probability of fluvial flooding, hence placing the site within Flood Zone 1. From the NPPF 'Flood Risk Vulnerability and Flood Zone Compatibility' identifies that Flood Zone 1 is land considered to be at low probability of flood risk. The SFRA also confirms that the site is in Flood Zone 1.
- 3.1.2 Table 3 of the NPPF identifies that more vulnerable uses of land are appropriate in Flood Zone 1. Table 2 of the NPPF identifies that more vulnerable development can include buildings used for dwelling houses. Extracts of these tables are shown below.
- 3.1.3 On this basis the proposed development is considered appropriate for the site, as there are no sequentially better sites.

More Vulnerable	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). <p>12. Water treatment plants and sewage treatment plants (if adequate pollution control measures are in place).</p>

Notes

1) This classification is based partly on Defra/Environment Agency research on Flood Risks to People (FD2321/TR2)21 and also on the need of some uses to keep functioning during flooding.

2) Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.

3) The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

Extract of Table 2 of the NPPF - Flood Risk Vulnerability Classification

Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More vulnerable	Less Vulnerable
Flood Zone	Zone 1	√	√	√	√	√
	Zone 2	√	√	Exception test	√	√
	Zone 3	Exception test	√	x	Exception test	√
	Zone 3b	Exception test	√	x	x	√
Key √ Development is appropriate x Development should not be permitted						

Extract of Table 3 of the NPPF - Flood Risk Vulnerability and Flood Zone Compatibility

3.1.4 Sequential Test

The NPPF requires that at all stages of planning, a Sequential Test is completed with the aim of steering new development to areas at the lowest probability of flooding (Flood Zone 1).

In this instance, as the site is located in Flood Zone 1, the Sequential Test can be deemed to be passed. Notwithstanding the above, the NPPF also requires the layout of the site to be sequentially tested however, the site is located entirely within Flood Zone 1. It is therefore not necessary to sequentially test the development layout.

3.1.5 Exception Test

Table 3 of the NPPF indicates when the Exception Test is required and reference to this table outlines that 'More' vulnerable uses in Flood Zone 1 do not require the application of the Exception Test.

3.2 Local Plan

3.2.1 In 2007, a review by the Secretary of State of the City and District of St Albans District Local Plan Review (1994) resulted in a number of policies being adopted. These included; 'Policy 84 - Flooding and River Catchment Management' and 'Policy 84A - Drainage Infrastructure'. These form part of the current adopted Local Plan;

- Policy 84 - Flooding and River Catchment Management

Part (iv) states that 'proposals shall not increase flood risk in areas downstream due to additional surface water runoff. If development is permitted, it must include appropriate

surface water runoff control measures.'

- Policy 84A - Drainage Infrastructure - The Council will consult Thames Water and the National Rivers Authority (*now the Environment Agency*) on all planning applications that may cause sewerage flooding. The following principles will apply:
 - (i) planning permission will not normally be granted for new development in areas which are considered presently at risk of sewerage flooding; or where development would result in an unacceptable risk of sewerage flood risk there or elsewhere.
 - (ii) a detailed drainage impact study may be required at planning stage
 - (iii) where planning permission is granted, it may be subject to the approval of a drainage strategy which may include phasing of the development.

3.3 Strategic Flood Risk Assessment (SFRA)

- 3.3.1 The Level 1 SFRA was undertaken by the Halcrow Group (August 2007) on behalf of Dacorum Borough Council, St Albans City & District Council, Three Rivers District Council and Watford Borough Council. The report was commissioned to help the four Councils prepare sustainable policies for the long term management of flood risk and improve emergency planning procedures. The key objective of the SFRA is to map all forms of flood risk and use this to locate new development primarily in low risk areas.
- 3.3.2 It is evident from a review of local and national planning policy that, in terms of flood risk, the site is suitable for residential and community development, provided that a sustainable drainage strategy is developed to mitigate potential flood risk from post development flows.

4 DEVELOPMENT PROPOSALS

4.1 Development Layout

- 4.1.1 The proposed development consists of approximately 100 residential units and will be built on greenfield agricultural land. The existing tree line surrounding the site to be retained where appropriate.
- 4.1.2 The proposals are shown on the CSa Environmental planning drawing Csa/2067/107 rev A, 'Illustrative Masterplan', a copy of which is included in **Appendix I**.
- 4.1.3 This drawing overlays the development proposals onto an aerial photograph and thus the setting of the site within its immediate surroundings is clearly shown.

4.2 Land Use Placement

- 4.2.1 As can be seen on the Illustrative Masterplan (Appendix XX), the lowest part of the site identified in the topographical survey as the eastern boundary, has been left as public open space. With this area and towards the south eastern corner, is to be the location of a balancing pond. The southern boundary will have a swale located along its length, which will fall towards and discharge into the balancing pond. The rest of the site will comprise of residential units.

5 PROBABILITY OF FLOODING

5.1 Sources of Flooding

5.1.1 The NPPF and SFRA identifies six potential sources of flooding:-

- Flooding from rivers (fluvial flooding);
- Flooding from the sea (tidal flooding);
- Flooding from land;
- Flooding from sewers;
- Flooding from groundwater; and
- Flooding from reservoirs, canals, and other artificial sources.

These are considered below.

5.2 How Flooding Will Occur

5.2.1 Flooding from rivers (fluvial flooding)

With reference to the indicative flood map published by the EA, (**Appendix D**) the site is shown to lie outside an area at risk of fluvial flooding for the 1% per annum probability event. The SFRA mentions that Wheathampstead experiences flooding from the River Lea however, the site sits approximately 30 metres above the river and therefore it is highly unlikely that the site would flood from out of bank flows.

5.2.2 Flooding from the sea (tidal flooding)

Based on the 'Flooding from Rivers and Sea' map in **Appendix D** the site is located outside of the flooding extent area.

5.2.3 Flooding from Land Runoff

The northern and southern boundaries of the site are relatively flat, apart from a section of the northern boundary that runs parallel to Hill Dyke Road where the site sits higher. The eastern boundary, which is the lowest part of the site, slopes down towards Dyke Lane. The western boundary is the only part of the site where the land adjacent to it is higher and therefore is the only area where flooding from land runoff could occur.

However, an existing housing estate is located on this land so surface water is likely to be managed effectively. Run off from this area also has to pass through a dense section of trees and vegetation before reaching the site and consequently much of the water is likely to be intercepted. Finally, any overland flows reaching the site will be picked up by the proposed drainage system and therefore is unlikely to cause any flooding. In summary the site is unlikely to receive overland surface water flows from beyond its boundaries.

Surface water runoff from the proposed development will be managed sustainably (see Section 6), so as not to result in unacceptable overland flows within the site.

5.2.4 Flooding from sewers

A review of Thames Water public sewer records confirms that there are no surface water sewers in the immediate area and thus a failure of their system does not present a risk to the site. Proposed sewers within the development will be designed in accordance with Sewers for Adoption 7th Edition and will cater for the 1 in 30 year return period critical event, without flooding.

5.2.5 Flooding from groundwater

Historical borehole data does not give any indication of groundwater levels therefore, a Site Investigation will have to be carried out in order to confirm the levels. However, as there are no existing surface water sewers in the vicinity, it is likely that surface water has been managed in the past using soakaways. This suggests a good infiltration rate and consequently, there is likely to be little, if any, groundwater flooding in the area.

Based on EA mapping, the site lies over a groundwater Source Protection Zone 3 however, other EA mapping suggests that the area is not at risk for groundwater drinking. Therefore, the surface water drainage strategy will have to include adequate pollution control if part of the surface water runoff is managed by soakaways. The drainage strategy will be discussed in more detail in Section 6.

5.2.6 Flooding from reservoirs, canals, and other artificial sources

A review of Ordnance Survey mapping indicates that there are no man-made structures, such as canals or reservoirs in the immediate vicinity of the site that could pose a flood risk. The EA's flood maps for potential reservoir flooding show the proposed site is not at risk.

5.3 Flood Zone

5.3.1 The assessment of flood risk in this report is based on the definitions in Table 1 of the Technical Guidance to the NPPF, which recognises the following Flood Zones:

- Flood Zone 1 - little or no risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000-year)
- Flood Zone 2 - low to medium risk, with annual probability of flooding of 0.1 to 1.0% from rivers and 0.1 to 0.5% from the sea
- Flood Zone 3a - high risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea.

5.3.2 With reference to the EA's indicative flood map, **Appendix D**, (also shown below) the site is located within Flood Zone 1.

5.3.3 The Level 1 Strategic Flood Risk Assessment (SFRA) also establishes that the site is in Zone 1. The development is therefore at low probability of flooding from fluvial sources.

6 SURFACE WATER MANAGEMENT

6.1 Surface water drainage

- 6.1.1 The total site area is approximately 3.51 ha. The approximate area of impervious surfaces (made up of roofs, hardstandings and roads) is 60% of the total area of the site. This results in an impermeable acre of 2.11 ha. The development has the potential to increase both the rate and the volume of surface water runoff, unless sustainable measures are put in place to mitigate post development flood risk.
- 6.1.2 As the site is greenfield, the existing drainage arrangement will rely on infiltration into the soil. Surface water will flow across the site from the high point on the western boundary towards the low point at the eastern boundary.
- 6.1.3 Historic borehole data shows there to be chalk in the vicinity of the site, which generally has a reasonable infiltration rate. Thames Water plans show no surface water sewers in the area, which suggests infiltration has been used. It is assumed that all surface water runoff can be managed on site through the use of infiltration based solutions, with no surface water outfall needed. However, it is understood that a soil investigation will need to be undertaken in order to assess actual groundwater levels and infiltration rates in the subsequent detailed design.
- 6.1.4 An assessment of the greenfield runoff rates for differing return periods, based on the site area, has been undertaken and these are summarised in the following table:

Return Period (Yrs)	Greenfield Runoff rate (l/s)
1	1.2
30	3.4
100	5.1

- 6.1.5 To account for climate change, an allowance of 30% for rainfall intensities will be used.
- 6.1.6 Based on this, the infiltration systems on site will have to accommodate a 5.1l/s 1 in 100 year greenfield runoff plus the additional 30% for climate change. An assumed infiltration of 9.8×10^{-6} m/s will be used to determine the onsite storage needed (based on historical borehole data).
- 6.1.7 To avoid contamination to the groundwater, it is proposed that any surface water from the proposed estate roads will be conveyed to the swale on the southern boundary of the site.

This will convey the water to the balancing pond at the eastern end of the site in addition to the use of deep trapped gullies and the inclusion of catchpits, assist in managing any residual oil or other pollution that may be transferred in runoff from the road. This water will then infiltrate into the ground on site.

6.1.8 Surface water runoff from roofs will be conveyed to appropriately sized soakaways located within the gardens of the proposed dwellings. Catchpits will be included to assist in the removal of silt and minor pollutants before the water is infiltrated into the ground. Drawing E3090/25 'Indicative Drainage Areas' in **Appendix K** shows the drainage areas and potential soakaway locations and numbers.

6.1.9 Using Microdrainage design software, an approximation of the amount of storage required in the balancing pond, swale and soakaways was determined based on the 1 in 100 year event with 30% climate change. The volumes are shown in the table below (the impermeable area for the soakaways is 60% of the total drainage area):

Infiltration method	Total Drainage Area (m ²)	Impermeable Area (m ²)	Approximate Storage required (m ³)
Balancing Pond/Swale	3200	3200	98 to 235
Soakaway 1	755	453	14 to 33
Soakaway 2	1350	810	25 to 59
Soakaway 3	3217	1930.2	59 to 141
Soakaway 4	2770	1662	51 to 122
Soakaway 5	1631	978.6	30 to 72
Soakaway 6	2300	1380	42 to 101
Soakaway 7	1615	965	30 to 71
Soakaway 8	2040	1224	37 to 89
Soakaway 9	1340	804	24 to 59
Soakaway 10	990	594	18 to 43
Total storage required	21208	14000.8	369 to 1025

6.1.10 Based on the post development impermeable areas and proposed site infiltration rate ($9.8 \times 10^{-6} \text{m/s}$), the total volume of storage required to accommodate the critical duration 1% per annum probability event plus 30% climate change is approximately 369m^3 to 1025m^3 . Microdrainage gives a range for the amount of storage needed from the worst scenario to the best scenario. It should be noted that this is an approximation based on historical borehole data to determine an infiltration rate. Therefore it is acknowledged that

a Site Investigation needs to be undertaken to determine actual infiltration rates, as well as any other issues that may occur with this proposed strategy.

- 6.1.11 The potential of deep borehole soakaways into the underlying chalk at depth could be another possible infiltration solution. These could be located within the public open space at the eastern end of the site. The viability of this option will need to be assessed by a site investigation.

6.2 Flood-related Risks Remaining After Implementation of Flood Protection Measures

- 6.2.1 All elements of the piped drainage system will be designed to accommodate storms up to and including the 1 in 30 year critical event without flooding. Levels will be designed so that any ponding resulting from storms in excess of this and up to the 1 in 100 year plus a 30% allowance for climate change event, will be retained within the boundary of the development without causing flooding to the proposed buildings.
- 6.2.2 Safe access will be maintained to all buildings for all storm events up to and including the 1:100 year plus 30% climate change event.
- 6.2.3 Analysis of overland flood routing will be made at the detailed design stage to ensure that overground surface water flows in exceedance events are channelled away from buildings.

6.3 Management of Risks

- 6.3.1 In order to reduce the risk of soakaways silting up, the installation of catchpits will be included. These catchpits will need to be maintained and emptied regularly to ensure the soakaways carry on functioning adequately.
- 6.3.2 A geomembrane lining will also be installed around the proposed soakaways to limit the extents of siltation.
- 6.3.3 Reed beds could be planted in the balancing pond to remove pollutants from the surface water before it is infiltrated.
- 6.3.4 A stilling basin could be installed prior to the balancing pond to further remove pollutants and silt from entering the balancing pond.
- 6.3.5 The use of permeable pavement construction to the areas of adoptable highway will also be considered. Porous paving areas will be maintained in accordance with manufacturer's

details. This will include mechanical sweeping on an annual basis.

- 6.3.6 Water quality will be maintained through the proposed SuDS drainage elements discussed above.

6.4 Climate Change

- 6.4.1 The drainage system has been designed with an increase of 30% applied to peak rainfall intensities. When determining the indicative storage areas required, the allowance of 30% for climate change was taken into account with the Microdrainage calculations (see **Appendix H**). This means that the proposed surface water drainage system for the development can accommodate the 1 in 100 year return period critical duration event with 30% allowance for climate change.

7 CONCLUSIONS

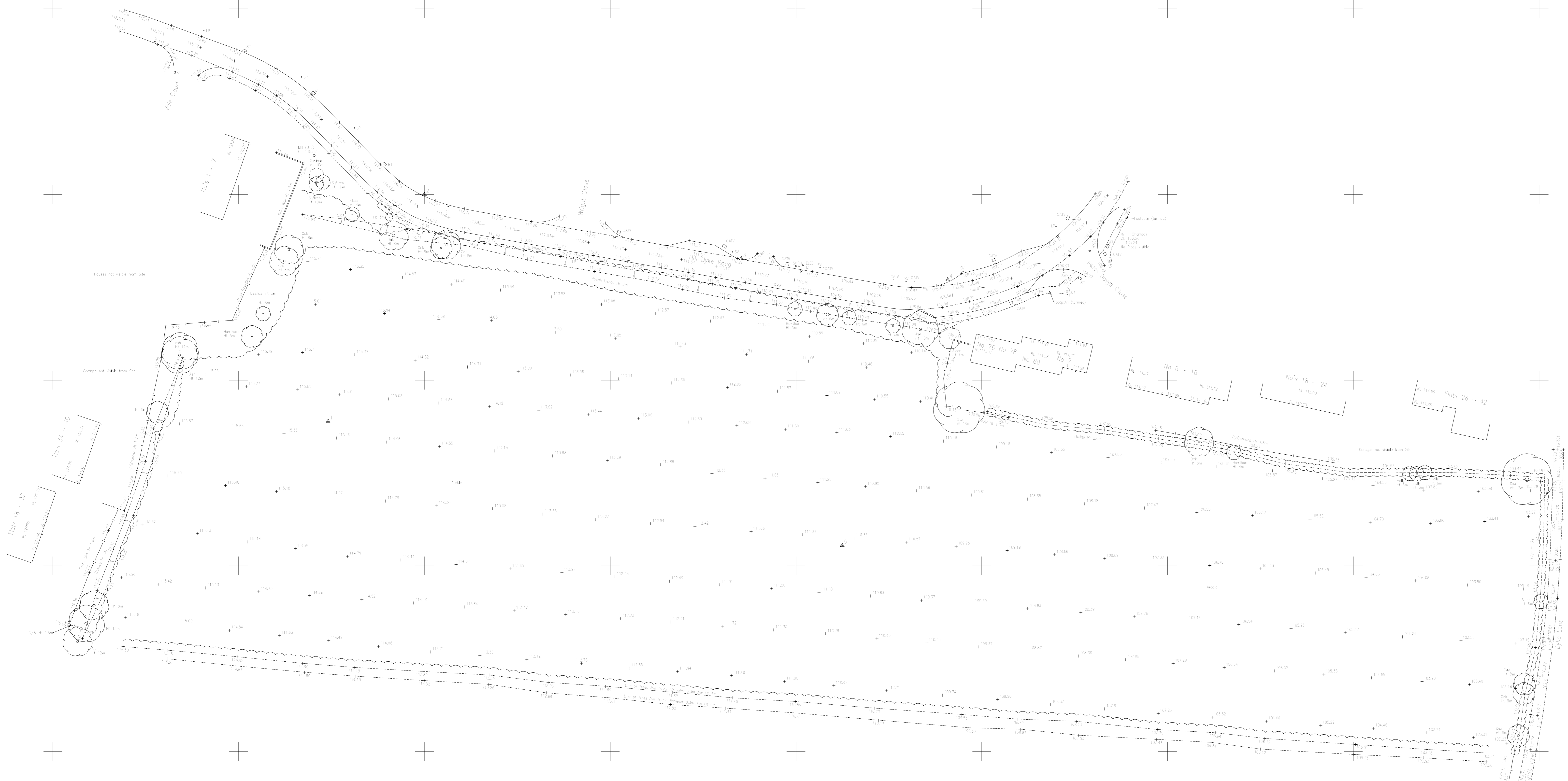
- 7.1.1 All of the site is located within Flood Zone 1; land assessed as having a low probability of flooding from fluvial sources.
- 7.1.2 The development will not be at risk of flooding post-development as SuDS and attenuation measures will be provided on site to accommodate the volume of runoff generated from the critical duration 1 in 100 year storm, including climate change. The proposed surface water generated from the site will be attenuated and infiltrated into the ground on site. There will be no increase in flood risk to the site or downstream catchment. Site levels will ensure that runoff will be kept away from buildings.
- 7.1.3 Regular maintenance of the site drainage system will ensure the site is not flooded from post-development flows.
- 7.1.4 The proposed drainage strategy is based on infiltration rates determined from historical borehole data and as such is an indicative strategy. To confirm the use of the infiltration methods discussed a detailed site investigation will be undertaken. Suggested sustainable drainage methods which can be used in order to attenuate and allow infiltration of surface water into the ground include; permeable pavements, soakaways, swales and balancing ponds.
- 7.1.5 Subject to the results of soakage tests, further consideration within the suggested site investigation should be given to the use of deep borehole soakaways.
- 7.1.6 Appropriate pollution control measures will ensure there is no risk to the environment resulting from development. Trapped gullies and SuDS measures will remove silts and heavy particles from the surface water runoff.
- 7.1.7 The site is likely to generate low foul water flows, which could be discharged into the nearby Thames Water foul water sewer system. An assessment of a potential connection will undertaken following consultation with Thames Water.
- 7.1.8 In summary, the site is not at risk from the sources of flooding considered, as suitable sustainable engineering measures can be implemented to mitigate and manage flood risk. A site investigation will be undertaken in order to determine actual site conditions during the detailed design stage.

APPENDICES

APPENDIX A

APPENDIX B

Rev	Date	By	Checked	Notes
1	15.04.13	M.J.L.	T.J.W.	Issue for approval
2	22.04.13	M.J.L.	T.J.W.	Issue for approval
3	22.04.13	M.J.L.	T.J.W.	Issue for approval
4	22.04.13	M.J.L.	T.J.W.	Issue for approval



Rev	Description	Date	Drawn By	Checked By

PRELIMINARY

Written dimensions to be taken. Do Not Scale off the drawing.
 Any discrepancies, written or scaled, should be brought to the attention of the engineer immediately.
 This drawing is to be read in conjunction with the relevant Bills of Materials and the Local Authority Specification.
 All relevant information identifying the unavoidable risks has been passed to the planning supervisor for inclusion in the Health and Safety plan.
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Wormald Burrows Partnership Limited
 Civil Engineering Consultants
 12a - 16a Milton Street, Basingstoke, SO21 8AX
 Tel: 01757 312244 Fax: 01757 315434
 Web: www.wormaldburrows.com
 Email: engineer@wormaldburrows.com

Project:
 Land to South of Hill Dyke Road, Wheathampstead

Drawing Description:
 Topographical Survey

Client: Taylor Wimpey Taylor Wimpey UK Ltd Strategic Land Stratfield House Station Road Hook Hampshire RG27 9PQ	Drawing Number: E3090/25
Scale: 1:500 @ A0	

Drawn By: M.J.L. Date: 15.04.13	Checked By: T.J.W. Date: 22.04.13
--	--



APPENDIX C



Enter a postcode or place name:

Other topics for this area...

Groundwater

Map legend

Click on a catchment to see more details

Groundwater source protection zones [?](#)

Inner zone (Zone 1)

Outer zone (Zone 2)

Total catchment (Zone 3)

Special interest (Zone 4)

Aquifer Maps - Superficial Deposits Designation [?](#)

Principal

Secondary A

Secondary B

Secondary (undifferentiated)

Unknown (lakes and landlip)

Aquifer Maps - Bedrock Designation [?](#)

Principal

Secondary A

Secondary B

Secondary (undifferentiated)

Groundwater Vulnerability Zones [?](#)

Major Aquifer High

Major Aquifer Intermediate

Major Aquifer Low

Minor Aquifer High

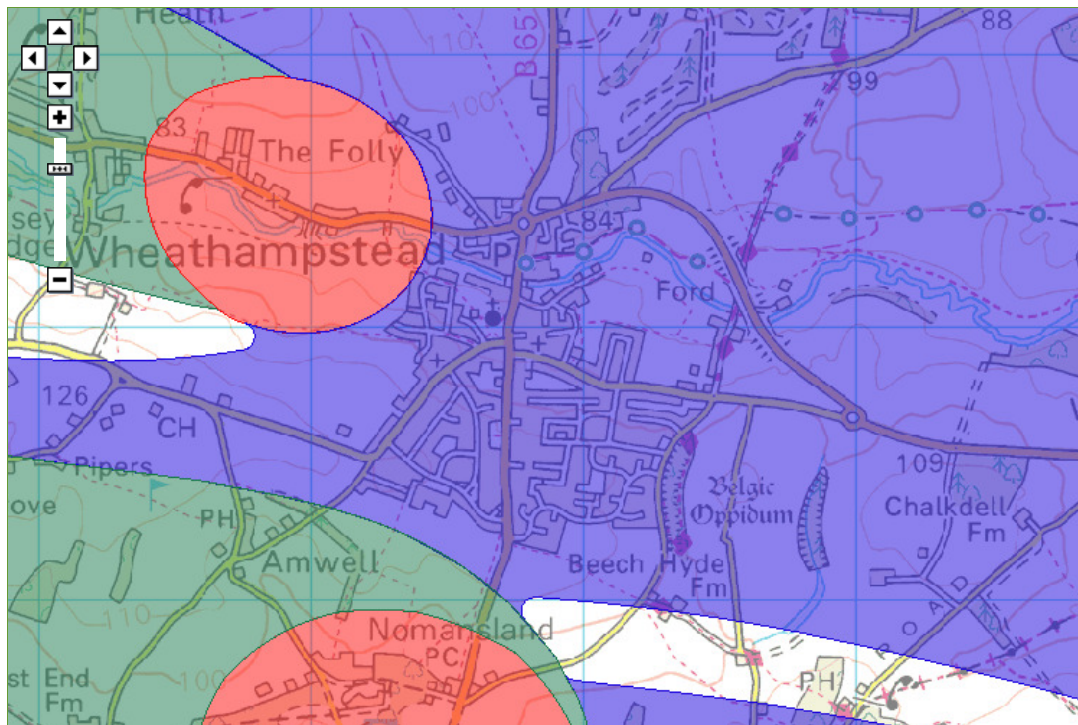
Minor Aquifer Intermediate

Minor Aquifer Low

Wheathampstead, Hertfordshire at scale 1:20,000

[Data search](#)

[Text only version](#)



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More about Groundwater

British Geological Survey Aquifer data:

The Aquifer Extents are not displayed at scales greater than 1:75,000 (Ordnance Survey 1:250,000 scale) as the data was only modelled to this level and is not accurate pass this.

New BGS Aquifer Designation Maps

From 1st April 2010 new aquifer designations replace the old system of classifying aquifers as Major, Minor and Non-Aquifer. This new system is in line with our Groundwater Protection Policy (GP3) and the Water Framework Directive (WFD) and is based on British Geological Survey mapping.

Groundwater Source Protection Zones data:

The Source Protection Zones are not displayed at scales greater than 1:20,000 (Ordnance Survey 1:50,000 scale) as the data was only modelled to this level and is not accurate pass this. They should not be compared against field boundaries.

Groundwater Source Protection Zones

Groundwater provides a third of our drinking water. We ensure that your water is safe to drink defining Source Protection Zones. These zones help to monitor the risk of contamination from any activities that might cause pollution in the area.

Facts and figures of our groundwater resources

Find out more about groundwater and groundwater levels.

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Enter a postcode or place name:

Other topics for this area...

Groundwater

Map legend

Click on a catchment to see more details

Groundwater source protection zones [?](#)

Inner zone (Zone 1)

Outer zone (Zone 2)

Total catchment (Zone 3)

Special interest (Zone 4)

Aquifer Maps - Superficial Deposits Designation [?](#)

Principal

Secondary A

Secondary B

Secondary (undifferentiated)

Unknown (lakes and landslip)

Aquifer Maps - Bedrock Designation [?](#)

Principal

Secondary A

Secondary B

Secondary (undifferentiated)

Groundwater Vulnerability Zones [?](#)

Major Aquifer High

Major Aquifer Intermediate

Major Aquifer Low

Minor Aquifer High

Minor Aquifer Intermediate

Minor Aquifer Low

Wheathampstead, Hertfordshire at scale 1:20,000

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Groundwater Source Protection Zones

Groundwater provides a third of our drinking water. We ensure that your water is safe to drink defining Source Protection Zones. These zones help to monitor the risk of contamination from any activities that might cause pollution in the area.

Facts and figures of our groundwater resources

Find out more about groundwater and groundwater levels.

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Enter a postcode or place name:



Other topics for this area...

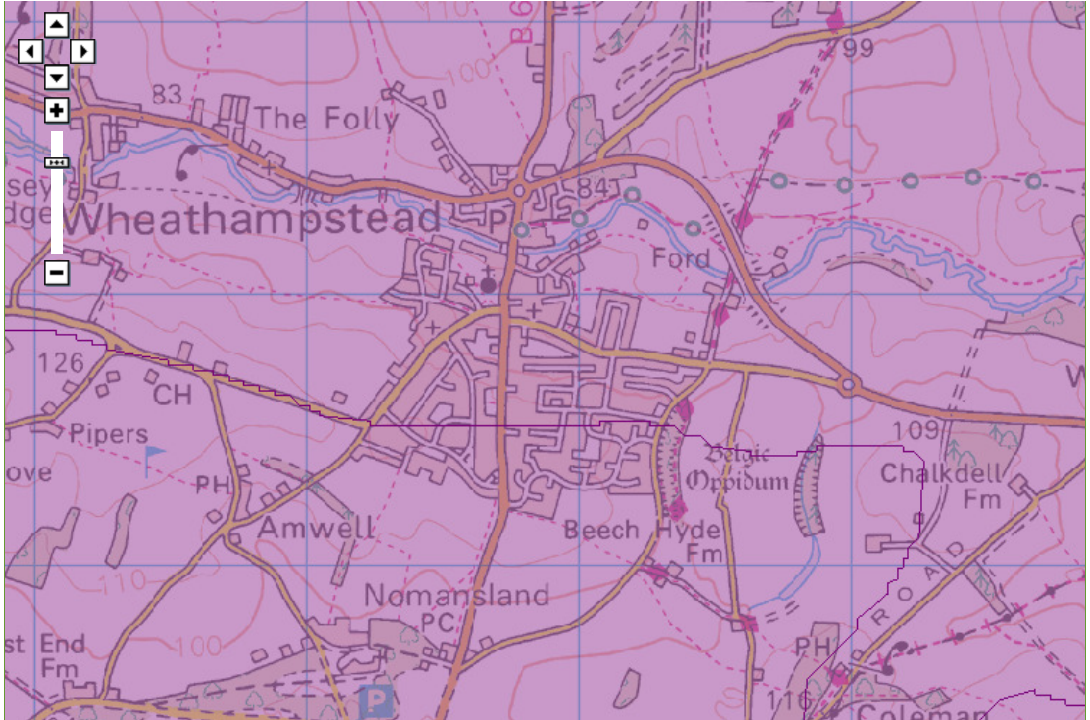
Drinking Water Protected Areas

Map legend

<input type="checkbox"/>	<input checked="" type="checkbox"/>	Surface Water Drinking Water Protected Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	At Risk Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not At Risk Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Surface Water Safeguard Zones
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safeguard Zones
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Groundwater Drinking Water Protected Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	At Risk Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Probably At Risk Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Probably Not At Risk Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not At Risk Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Groundwater Safeguard Zones
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safeguard Zones
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water Protection Areas
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Dee Catchment

X: 517,882;Y: 213,746 at scale 1:20,000

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Drinking Water Protected Areas:

What are Drinking Water Protected Areas?

Drinking Water Protected Areas (DrWPAs) are water bodies where 'raw' water is abstracted for human consumption at a rate of at least 10m³/day or where over 50 people are served. Abstractions of raw water can be from reservoirs, rivers and groundwater.

Raw water quality needs to be improved in some DrWPAs to avoid the need for extra treatment at drinking water treatment plants. Wherever there is a risk of extra drinking water treatment being required the DrWPA is designated 'at risk'. This does not mean there is a risk to our tap water. Tap water supplied by water companies in England and Wales is robustly regulated by the [Drinking Water Inspectorate](#) to ensure that it meets the required drinking water quality standards.

For 'at risk' DrWPAs we may establish Safeguard Zones. These non-statutory Safeguard Zones are areas where activities can impact adversely on the quality of water abstracted in the DrWPA. Action to address pollution is targeted in these zones so that extra treatment of raw water can be avoided. Safeguard Zones are a joint initiative between the Environment Agency and water companies. Safeguard Zones are one of the main tools for delivering the Drinking Water Protected Area objectives of the Water Framework Directive.

For further information please see [Annex D of our River Basin Management Plans](#).

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APPENDIX D



Enter a postcode or place name:

Other topics for this area...

Risk of Flooding from Rivers and Sea

Map legend

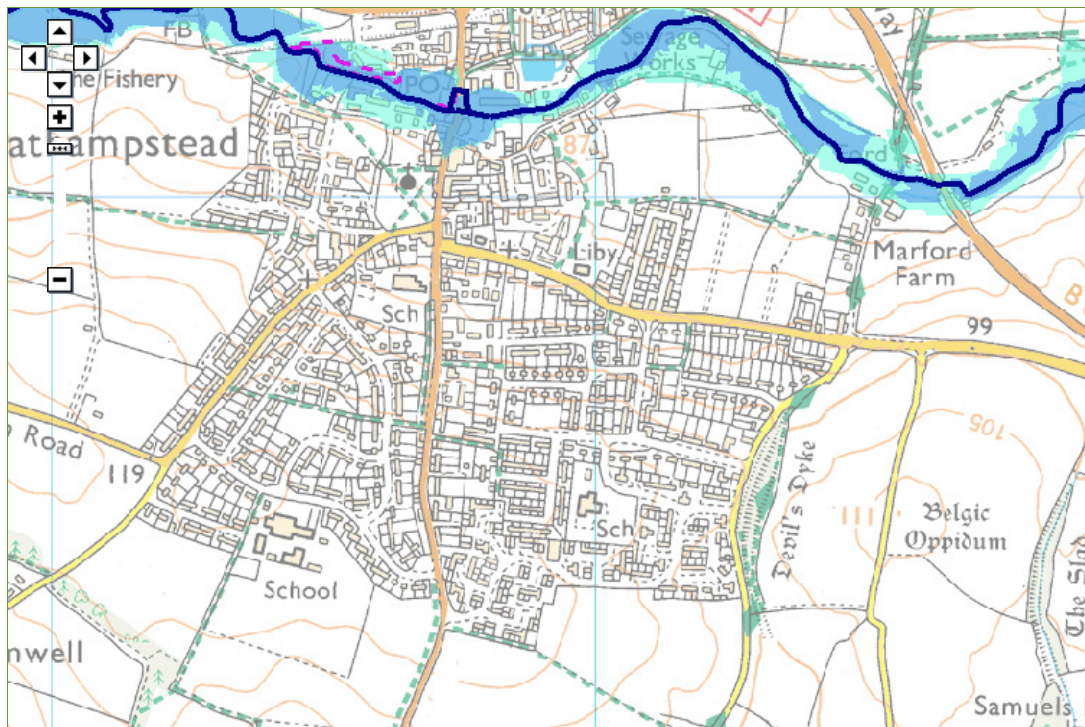
Click on the map to see what is the Risk of Flooding at a particular location.

Flood Maps [i](#)

- Flooding from rivers or sea without defences
- Extent of extreme flood
- Flood defences (Not all may be shown*)
- Areas benefiting from flood defences (Not all may be shown*)
- Main rivers

X: 517,917;Y: 213,684 at scale 1:10,000

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Flood Map – Information Warnings

Manchester Ship Canal

Flood Mapping of the Manchester Ship Canal in Trafford, Salford and Warrington was updated 9 August 2012 as a result of a judgment of the High Court. The judgment concluded that the Ship Canal sluice gates should not be regarded as 'formal' flood defences and that our decision to map the Ship Canal flood zones as if the sluice gates were closed was unlawful. We have applied to the Court of Appeal to appeal against this judgment, and we will keep this caveat updated. For further information please contact the Environment Agency on 03708 506 506.

* **Legend Information:** Flood defences and the areas benefiting from them are gradually being added through updates. Please contact your [local environment agency office](#) for further details.

More about flooding:

Understanding the flood map

A more detailed explanation to help you understand the flood map shown above.

Current flood warnings

We provide flood warnings online 24 hours a day. Find out the current flood warning status in your local area.

Flood map - your questions answered

Answers to commonly asked questions about the flood map.

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Author: The Environment Agency |

Last updated: 8th November 2012

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Enter a postcode or place name:

Other topics for this area...

Risk of Flooding from Reservoirs



Map legend

Click within the extent of flooding to see which reservoirs affect this area

Risk of Flooding from Reservoirs

Maximum extent of flooding

X: 517,948;Y: 213,681 at scale 1:10,000

[Data search](#)

[Text only version](#)



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Find out more:

This map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst case scenario, it's unlikely that any actual flood would be this large.

Remember - reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. Since then reservoir safety legislation has been introduced to make sure [reservoirs are well maintained](#).

Please note that only flood maps for large reservoirs are displayed. Flood maps are not displayed for smaller reservoirs or for reservoirs commissioned after reservoir mapping began in spring 2009. The reservoir flood maps also don't give any information about how likely any area is to be flooded.

If your property is within the green highlighted area, then you could be affected by reservoir flooding. To find out more about the reservoirs that could cause this flooding, click on the map within the green highlighted area. You will find the name and ownership details of the reservoirs that could cause flooding in your area.

If you want to find out about local emergency plans you should [contact the local authority](#) responsible for that emergency plan but be aware that these reservoir flood plans may take some time to develop. You can find out which local authority to contact by clicking on the map.

[Reservoir flooding](#)

[Guidance for people living near reservoirs](#)

[Your questions answered](#)

[Who to contact](#)

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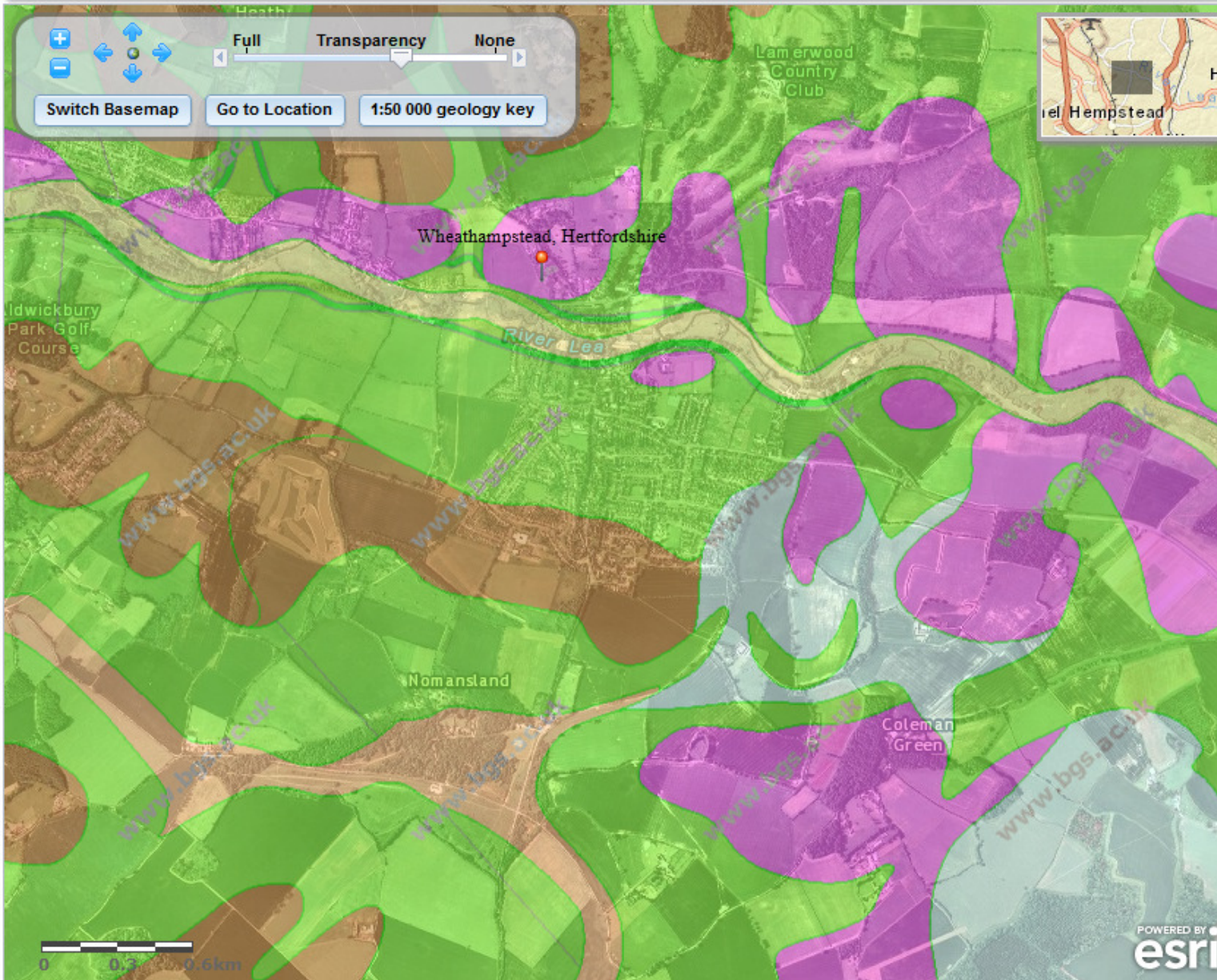
APPENDIX E



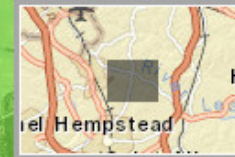
British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Geology of Britain viewer

Viewer for 1:625 000 and 1:50 000 scale digital geological maps
Click on the map to view a description of the geology



Map navigation controls including zoom in (+), zoom out (-), pan arrows, and a transparency slider set to 'Full'. Buttons for 'Switch Basemap', 'Go to Location', and '1:50 000 geology key' are also present.



POWERED BY
esri

TL 11 SE | 30

TL 11 SE 30 1852 1321 Beech-hyde Lane, Wheathamstead

Block F

British Geological Survey

British Geological Survey

British Geological Survey

Surface level (+ 107.6 m) + 353 ft
Water not struck
February 1972

Waste 2.8 m
Bedrock 0.2 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
British Geological Survey	Soil	British Geological Survey	British Geological Survey
Boulder Clay	Clay, brown mottled black, some flint and quartz pebbles	0.2	0.2
Upper Chalk	Chalk, white, soft	2.6	2.8
		0.2+	3.0

TL 11 SE | 31

TL 11 SE 31 1862 1241 Coleman Green, Sandridge

Block F

British Geological Survey

British Geological Survey

British Geological Survey

Surface level (+ 111.6 m) + 366 ft
Water not struck
February 1972

Waste 2.2 m
Bedrock 0.1 m +

LOG

Geological classification	Lithology	Thickness m	Depth m
British Geological Survey	Soil	British Geological Survey	British Geological Survey
Glacial Sand and Gravel	Clay, brown mottled black, with flint pebbles	0.3	0.3
Upper Chalk	Chalk	1.9	2.2
		0.1+	2.3

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

APPENDIX F

Hill Dyke Road

Prepared for:

Searchflow
Searchflow
42 Kings Hill Avenue
Kings Hill
West Malling
Kent
ME19 4AJ

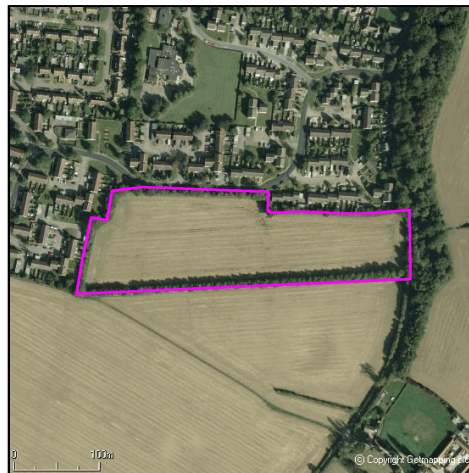
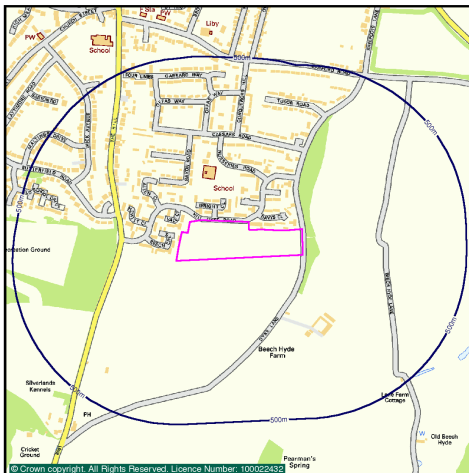
Report Reference: SAS_45408931_1_1

Report Date: 11-APR-2013

Customer Reference: SF18933123000

National Grid Reference: 518070 213230

Site Area: 36892 m²



If you have any questions on the contents of this Report please contact Landmark Customer Helpdesk which is open from 9:00am - 5:30pm, Monday - Friday, via one of the following channels:

Telephone:
Fax:
Email:
Website: www.sitecheck.co.uk

PASSED

The Sitecheck report dated 11-APR-2013 and reference SAS_45408931_1_1 for Hill Dyke Road has examined the sources of potential contamination in terms of historical land use, environmental data and current land uses where known.

The report has highlighted the presence of Unknown Filled Ground (Pond, marsh, river, stream, dock etc) on or within 25m of the site boundary.

INTRODUCTION

This professional opinion determines the level of environmental risk, as to whether a pollutant linkage exists which is created when there is a source of contamination, a pathway for it to travel along and receptors, which may be harmed. This risk-based approach underpins the government approach to contaminated land. If a pollutant linkage exists the property may be regarded by the local authority as being "Contaminated Land" for the purposes of Part 2A of the Environmental Protection Act 1990.

In completing this report, Argyll Environmental has undertaken a review of data made available to it. No site inspection, further enquiries or investigation of surface or ground conditions has been carried out by Argyll Environmental. No information as to the age, value and type of property has been made available. It is important to note that it is not known by Argyll Environmental for what purpose the report has been commissioned.

FACTORS AFFECTING THIS PROPERTY

Potential Sources:

A detailed examination of the historical Ordnance Survey maps from 1879 to 2013 has revealed that the site has been in agricultural use since the first map edition.

From a review of historical map data the Sitecheck Assess Report has identified that the site is located on or within 25 metres of unknown filled ground (pond, marsh, river, stream, dock etc).

Potential Pathways:

- Direct human contact with soil (and water).
- Contamination transport to shallow groundwater.
- Contamination transport to deep groundwater.
- Gas migration through soils, service media and building foundations.

Potential Receptors:

The property itself, surrounding properties and their respective occupants may be considered as receptors. Buildings and people can suffer harm by definition of Part 2A of the Environmental Protection Act 1990.

Current Ordnance Survey mapping indicates residential properties within 25 metres of the site boundary.

The groundwater vulnerability map sheet 39 West London has revealed that the site is located above a major aquifer.

Professional Opinion on environmental risk

Since major aquifers are able to support large abstractions for public water supply they may be considered sensitive receptors.

BGS map sheet 39 West London 1;100,000 identifies drift deposits.

Environment Agency data has revealed that the site is on or within 25 metres of the Zone III (Total Catchment) of a source protection zone relating to a groundwater abstraction used for public drinking water supply.

CONCLUSIONS:

In the professional opinion of Argyll Environmental, the level of risk associated with the information disclosed in the associated Sitecheck Assess report:

- 1) is unlikely to have an adverse effect on the value of the property, and
- 2) is not such that the property would be designated "contaminated land" within the meaning of Part IIA of the Environmental Protection Act 1990.

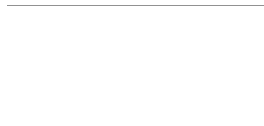
OTHER ENVIRONMENTAL FACTORS:

In this case the following environmental factors have been identified which a client may wish to be investigated before proceeding further:

- A natural or man made cavity
- An area of Occasional Non-coal Mining Hazard
- An area of Subsidence Hazard Potential
- An area of Unlikely Non-coal Mining Hazard

Please refer to the relevant section in the report for each of the above factors.

Approved by



Christopher S. Taylor BSc (Hons), MSc, AIEMA
Chartered Water and Environmental Manager
Technical Director, Argyll Environmental Limited



SOURCES OF ADDITIONAL PROFESSIONAL GUIDANCE:

If the report is for valuation, or investment, or other forms of lending decision making there may be issues arising from the current occupation, which need to be examined. The Royal Institution of Chartered Surveyors has provided guidance with respect to such matters and specific reference should be made to the guidance note 'Contamination, the environment and sustainability - Implications for chartered surveyors and their clients' published April 2010. This guidance note is referred to in UKGN1.1 paragraph 2.2 of the RICS Valuation Standards (6th Edition) (The "Red Book").

It is recommended that the client reviews the outputs of any valuation report, which should include a Property Observation Checklist, contained at Appendix A for commercial property or Appendix B for rural property in the Royal Institution of Chartered Surveyors guidance note 'Contamination, the environment and sustainability - Implications for chartered surveyors and their clients'. Completion of these checklists does not constitute an environmental assessment for the purposes of Professional Indemnity Insurance where many surveyors are unlikely to have appropriate indemnity cover. Any contamination, which is observed on the site by the surveyor during the normal course of their inspection, can also be recorded.

If the property is let, the landlord or the tenant (as appropriate) should take legal advice as to whether the covenants in the lease constitute legal or financial burdens. The Law Society's "Environmental Law Handbook-6th Edition" provides valuable assistance.

In leases with no express covenants dealing with environmental matters, lawyers and surveyors need to be aware of the extent to which the repairing of covenants can be applied and, when advising tenant clients in particular, will need to draw attention to the client's obligations to comply with enacted legislation.

Should contamination have been observed on site a suitably qualified, insured and experienced professional, preferably with the Specialist in Land Condition (SiLC) accreditation, should quantify whether this could give rise to an action by a regulator or any other party. A suitable management plan for action incorporated in a Land Quality Statement in accordance with RICS guidance should be put in place and appropriate matters taken up with the tenant / occupier.

In terms of development this report should be seen as a precursor to a thorough investigation of the property for planning control purposes. The DTI funded guidance published by the Construction Industry Research and Information Association (CIRIA) Brownfields-managing the development of previously developed land-a clients guide may be a useful starting point.

This professional opinion forms part of the Sitecheck Assess report and is subject to Landmark Information Group's Terms and Conditions of Business in force from time to time. Further information on the methodology and the datasets examined in this professional opinion is included in the Sitecheck Asses Practitioner Guide.

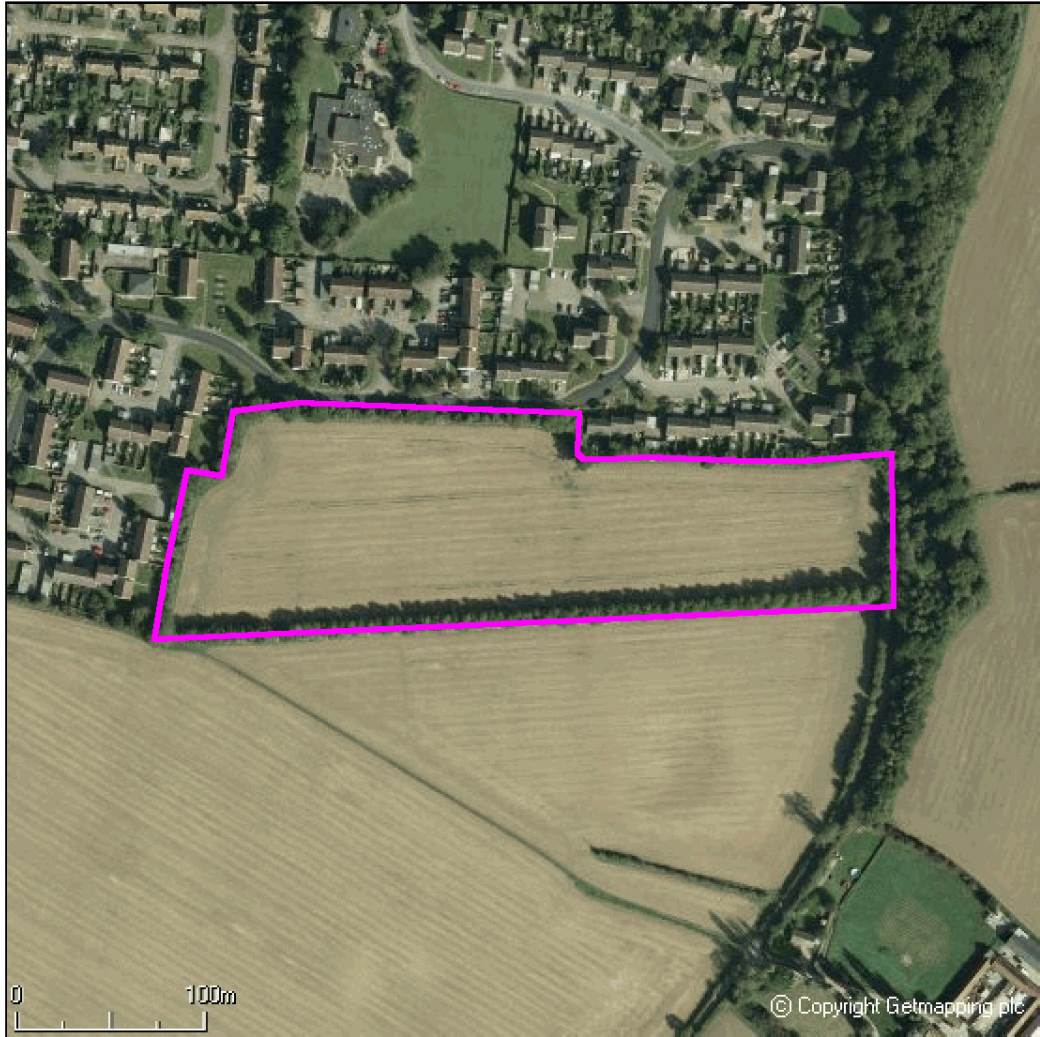
Report Sections and Details	Page
Summary of Site	-
This section comprises contaminant, pathway and receptor information found on site. Other factors which may affect the site are also included.	
Aerial Photo	1
The aerial photo gives an overall view of the area. The smaller large-scale Ordnance Survey map includes the site boundary and search zone buffer at 500m.	
Location Map	2
The large-scale Ordnance Survey map includes the site boundary and search zone buffer at 500m. The smaller aerial photo also includes the site boundary.	
Summary Table	3
This section comprises of a summary table of the information found on site and in its vicinity.	
Current Land Use	7
This section contains a map, which shows current land use features. The following pages detail these features and identify the Reference Number and direction.	
Historical Land Use	10
This section contains a map, which shows historical land use features. The following pages detail these features and identify the Reference Number and direction. A table listing all the maps used to source this information is included.	
Sensitivity	13
This section contains a map, which shows pathway and receptor features. The following pages detail these features and identify the Reference Number and direction. This section also contains a separate Flood Map and flood details.	
Other Factors	16
This section contains information on other factors which may affect the site and its vicinity.	
Useful Information	18
This section contains information which may be of use when interpreting the report.	
Useful Contacts	19
All textual information is linked by the 'Contact Ref' to this quick reference list of contacts. These contacts may be able to supply additional information or answer any subsequent query relating to that record.	

Sensitivity Pathways	Page No.	Reference Number (Map ID)
Groundwater Vulnerability		
Geological Classification: Major Aquifer (Highly permeable) - These are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public water supply and other purposes, Soil Classification: Soils of Intermediate Leaching Potential (I1) - Soils which can possibly transmit a wide range of pollutants, Map Scale: 1:100,000, Map Name: Sheet 39 West London, Contact Ref: 2	15	-
Drift Deposits		
Drift Deposit: Low permeability drift deposits occurring at the surface and overlying Major and Minor Aquifers are head, clay-with-flints, brickearth, peat, river terrace deposits and marine and estuarine alluvium, Contact Ref: 2	15	-

Sensitivity Environmentally Sensitive Receptors	Page No.	Reference Number (Map ID)
Source Protection Zones		
Various, Reference: Not Supplied, Type: Zone III (Total Catchment): The total area needed to support the discharge from the protected groundwater source., Contact Ref: 2	15	-

Other Factors Geological	Page No.	Reference Number (Map ID)
Non Coal Mining Areas of Great Britain		
Hazard Potential: Unlikely, Contact Ref: 3	16	-
Radon Potential - Radon Affected Areas		
Affected Areas: The property is in a lower probability radon area, as less than 1% of homes are above the action level, Source: British Geological Survey, National Geoscience Information Service, Contact Ref: 3	16	-
Radon Potential - Radon Protection Measures		
Radon Protection Measures: None, Source: British Geological Survey, National Geoscience Information Service, Contact Ref: 3	16	-
Potential for Ground Dissolution Stability Hazards		
Hazard Potential: Moderate, Contact Ref: 3	16	-
Potential for Landslide Ground Stability Hazards		
Hazard Potential: Very Low, Contact Ref: 3	16	-

Other Factors	Page No.	Reference Number (Map ID)
Geological		
Potential for Running Sand Ground Stability Hazards		
Hazard Potential: Very Low, Contact Ref: 3	16	-
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
Hazard Potential: Low, Contact Ref: 3	17	-
Potential for Collapsible Ground Stability Hazards		
Hazard Potential: Very Low, Contact Ref: 3	16	-



Site

Hill Dyke Road

Grid Reference

518070, 213230

Report Reference

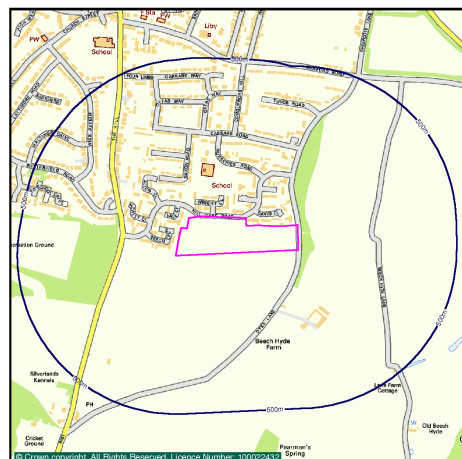
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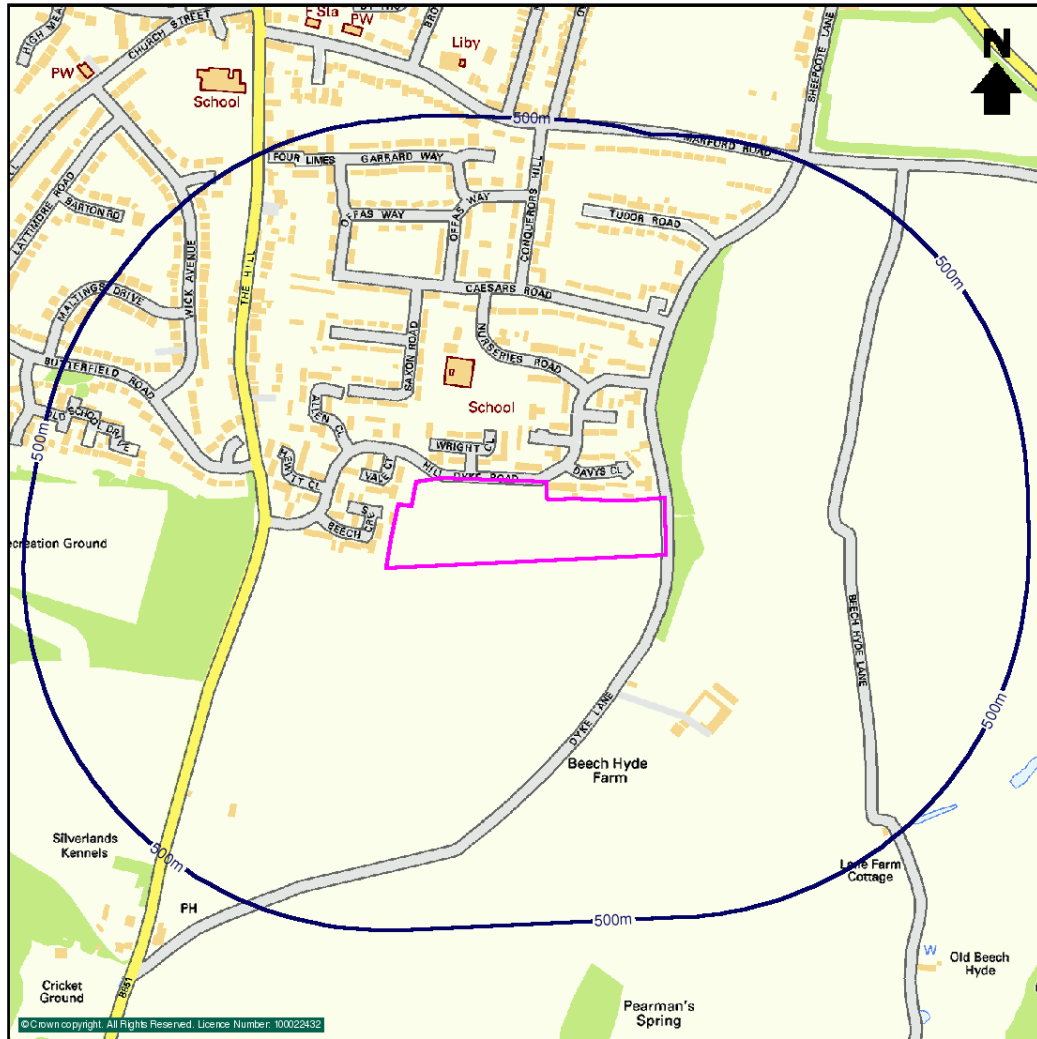
Customer Reference

SF18933123000

Size of Site

36892 m²





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Site

Hill Dyke Road

Grid Reference

518070, 213230

Report Reference

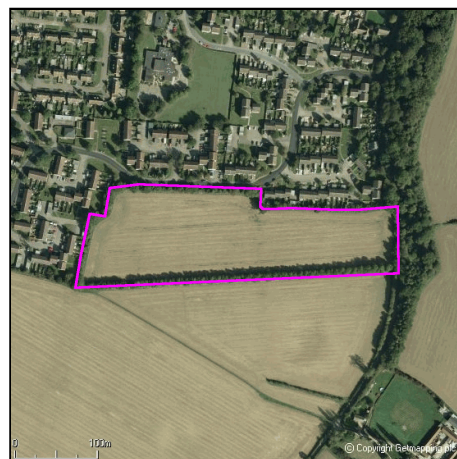
SAS_45408931_1_1

Customer Reference

SF18933123000

Size of Site

36892 m²



Current Land Use	On Site	0-250m	250-500m
Contaminants	0	5	6
Waste / Landfill Sites			
BGS Recorded Landfill Sites	0	0	0
Licensed Waste Management Facilities (Landfill Boundaries)	0	0	0
Licensed Waste Management Facilities (Locations)	0	0	0
Local Authority Recorded Landfill Sites	0	0	2
Registered Landfill Sites	0	0	1
Registered Waste Transfer Sites	0	0	0
Registered Waste Treatment or Disposal Sites	0	0	0
Statutory Authorisations			
Local Authority Pollution Prevention and Controls	0	0	0
Contaminated Land Register Entries and Notices	0	0	0
Registered Radioactive Substances	0	0	0
Discharge Consents			
Discharge Consents	0	2	1
Water Industry Act Referrals	0	0	0
Industrial Processes			
Integrated Pollution Controls	0	0	0
Integrated Pollution Control Registered Waste Sites	0	0	0
Integrated Pollution Prevention And Control	0	0	0
Local Authority Integrated Pollution Prevention And Control	0	0	0
Storage of Hazardous Substances			
Control of Major Accident Hazards Sites (COMAH)	0	0	0
Explosive Sites	0	0	0
Notification of Installations Handling Hazardous Substances (NIHHS)	0	0	0
Planning Hazardous Substance Consents	0	0	0
Contraventions			
Local Authority Pollution Prevention and Control Enforcements	0	0	0
Enforcement and Prohibition Notices	0	0	0
Planning Hazardous Substance Enforcements	0	0	0
Prosecutions Relating to Authorised Processes	0	0	0
Prosecutions Relating to Controlled Waters	0	0	0
Substantiated Pollution Incident Register	0	0	0

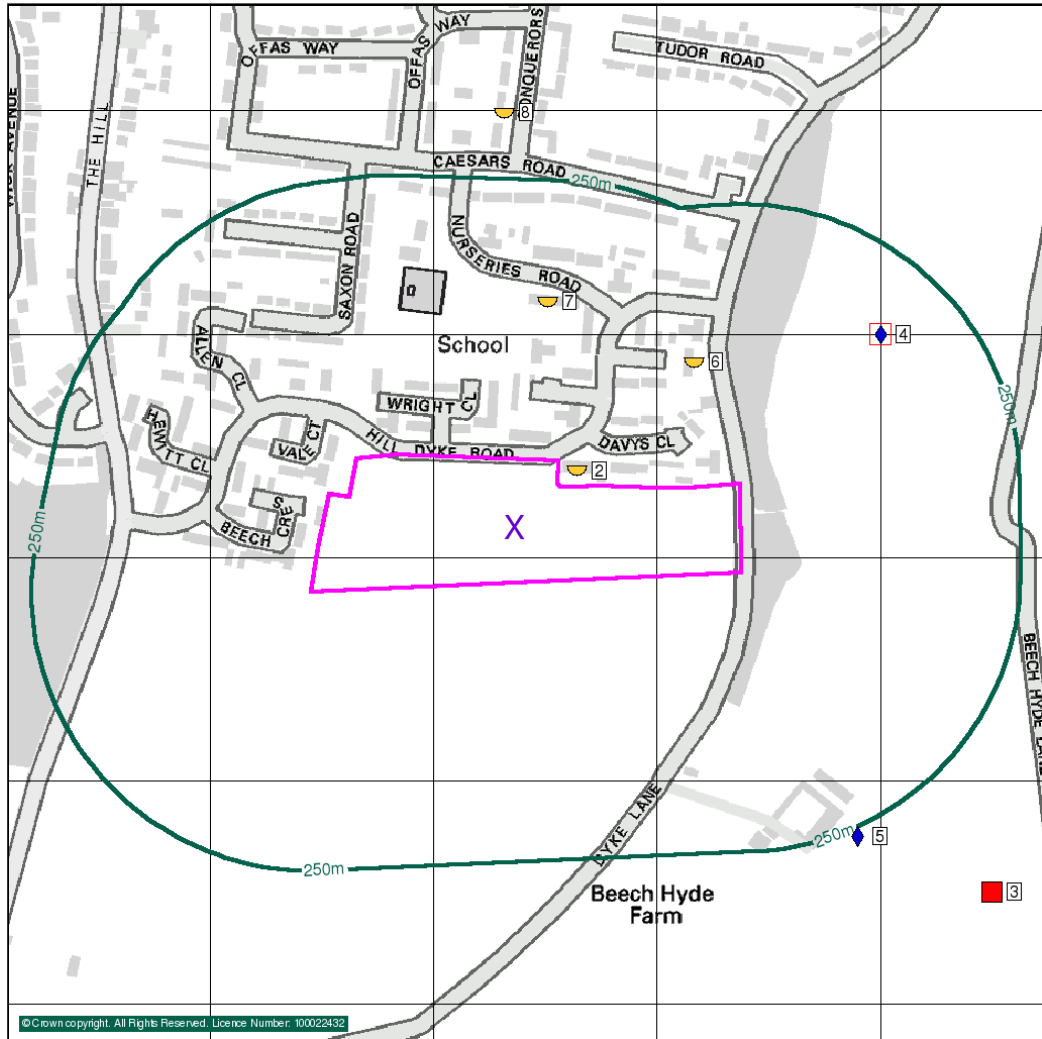
Current Land Use	On Site	0-250m	250-500m
Contaminants	0	5	6
Potentially Contaminative Uses			
Contemporary Trade Directory Entries	0	3	1
Fuel Station Entries	0	0	0
Miscellaneous			
BGS Recorded Mineral Sites	0	0	1

Historical Land Use	On Site	0-250m	250-500m
Contaminants	0	5	8
Potentially Contaminative Uses			
Historical Tanks And Energy Facilities	0	3	4
Potentially Contaminative Industrial Uses (Past Land Use)	0	0	2
Potentially Infilled Land			
Former Marshes	0	0	0
Potentially Infilled Land (Non-Water)	0	0	1
Potentially Infilled Land (Water)	0	2	1

Sensitivity	On Site	0-250m	250-500m
Pathways and Receptors	3	1	1
Pathways			
Groundwater Vulnerability	1	n/a	n/a
Drift Deposits	1	n/a	n/a
Historical Flood Liabilities	0	0	0
Extreme Flooding from Rivers or Sea without Defences	0	0	n/a
Flooding from Rivers or Sea without Defences	0	0	n/a
Areas Benefiting from Flood Defences	0	0	n/a
Flood Water Storage Areas	0	0	n/a
Flood Defences	0	0	n/a

Sensitivity	On Site	0-250m	250-500m
Pathways and Receptors	3	1	1
Environmentally Sensitive Receptors			
Areas of Outstanding Natural Beauty	0	0	0
Environmentally Sensitive Areas	0	0	0
Local Nature Reserves	0	0	0
Marine Nature Reserves	0	0	0
National Nature Reserves	0	0	0
Nearest Surface Water Feature	0	0	0
Ramsar Sites	0	0	0
Sites of Special Scientific Interest	0	0	0
Source Protection Zones	1	1	1
Special Areas of Conservation	0	0	0
Special Protection Areas	0	0	0
Water Abstractions	0	0	0
Protected Countryside Areas			
Forest Parks	0	0	0
National Parks	0	0	0
National Scenic Areas	0	0	0

Other Factors	On Site	0-250m	250-500m
Geological	9	6	0
Brine Compensation Area	0	n/a	n/a
Coal Mining Affected Areas	0	n/a	n/a
Mining Instability	0	0	n/a
Man-Made Mining Cavities	0	0	0
Natural Cavities	0	1	0
Non Coal Mining Areas of Great Britain	1	1	n/a
Radon Potential - Radon Affected Areas	1	n/a	n/a
Radon Potential - Radon Protection Measures	1	n/a	n/a
Potential for Collapsible Ground Stability Hazards	1	0	n/a
Potential for Compressible Ground Stability Hazards	1	0	n/a
Potential for Ground Dissolution Stability Hazards	1	1	n/a
Potential for Landslide Ground Stability Hazards	1	1	n/a
Potential for Running Sand Ground Stability Hazards	1	1	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	1	1	n/a



General	Waste/Landfill Sites	Contraventions	Storage Of Hazardous Substances	Statutory Authorisations
<ul style="list-style-type: none"> Site Boundary Search Buffer Bearing Reference Point Reference Number 	<ul style="list-style-type: none"> BGS Recorded Landfill Site Licensed Waste Management Facilities (Landfill) Local Authority Recorded Landfill Site Registered Waste Transfer Site Registered Waste Treatment or Disposal Site Registered Landfill Site 	<ul style="list-style-type: none"> Local Authority Pollution Prevention and Control Enforcement Planning Hazardous Substance Enforcement Prosecution Relating to Authorised Processes Enforcement and Prohibition Notice Substantiated Pollution Incident Register Prosecution Relating to Controlled Waters 	<ul style="list-style-type: none"> COMAH Planning Hazardous Substance Consent Explosive Site NHHS 	<ul style="list-style-type: none"> Local Authority Pollution Prevention and Control Contaminated Land Register Entry or Notice (Point) Contaminated Land Register Entry or Notice Registered Radioactive Substance
<ul style="list-style-type: none"> Miscellaneous BGS Recorded Mineral Site Potentially Contaminative Use Potentially Contaminative Use (High Risk) 	<ul style="list-style-type: none"> BGS Recorded Landfill Site (Point) Licensed Waste Management Facilities (Location) Local Authority Recorded Landfill Site (Point) Registered Waste Transfer Site (Point) Registered Waste Treatment or Disposal Site (Point) Registered Landfill Site (Point) Point Location of Registered Landfill Site Potential Landfill Buffer 	<ul style="list-style-type: none"> Integrated Pollution Control Enforcement and Prohibition Notice Substantiated Pollution Incident Register Prosecution Relating to Controlled Waters 	<ul style="list-style-type: none"> Industrial Processes Integrated Pollution Control Integrated Pollution Prevention Control Integrated Pollution Control Registered Waste Site Local Authority Integrated Pollution Prevention and Control 	<ul style="list-style-type: none"> Discharge Consents Discharge Consent Water Industry Act Referral

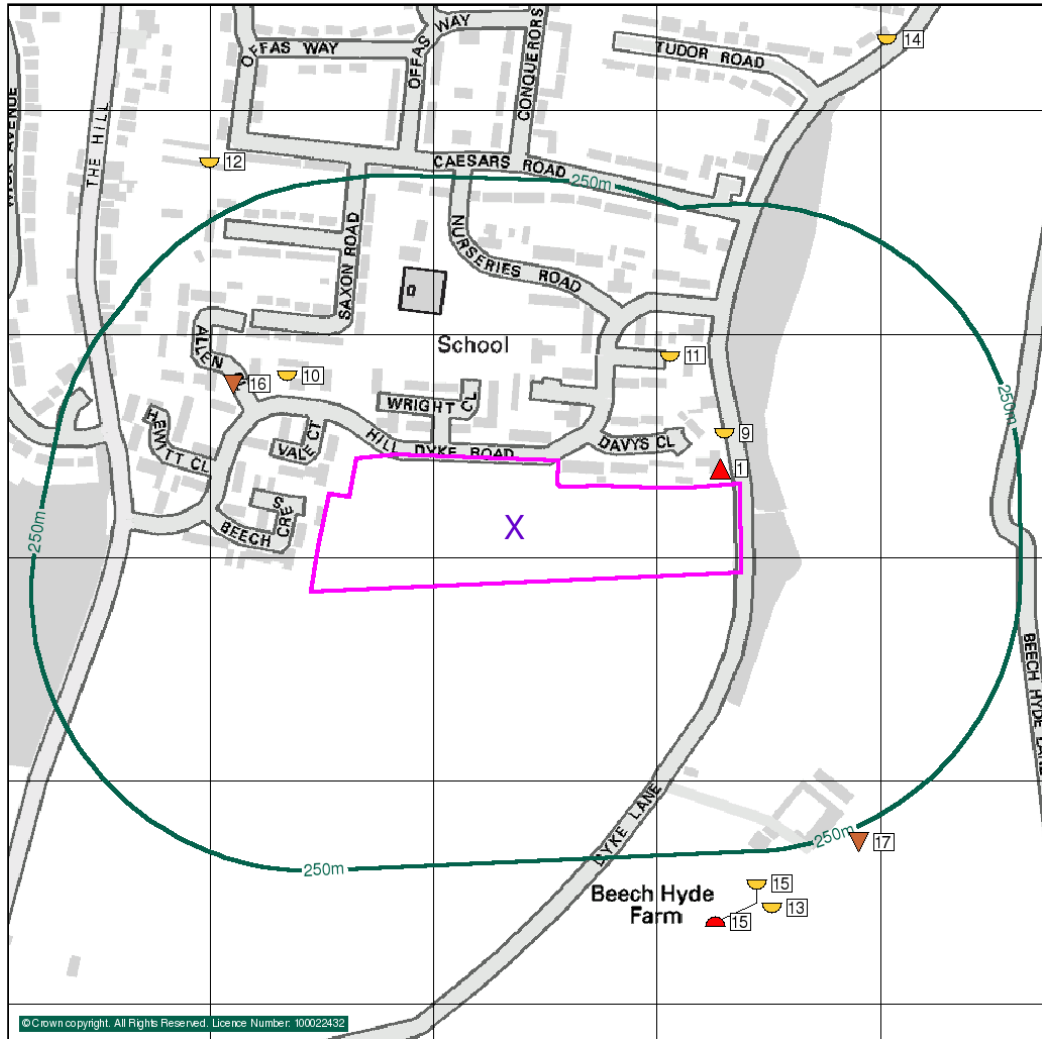
Contaminants	Ref No.	Search Buffer	Direction
Waste / Landfill Sites			
Local Authority Landfill Coverage			
Name: Hertfordshire County Council, - Has supplied landfill data, Contact Ref: 1	-	On Site	SW
Name: St Albans District Council, - Has supplied landfill data, Contact Ref: 5	-	On Site	SW
Local Authority Recorded Landfill Sites			
Samuels Farm, Coleman Green, Reference: 417, Positional Accuracy: Located by supplier to within 100m, Boundary Quality: Not Applicable, Contact Ref: 1	3	250-500m	SE
Wheathampstead School, Reference: 402, Positional Accuracy: Located by supplier to within 100m, Boundary Quality: Not Applicable, Contact Ref: 1	-	250-500m	W
Registered Landfill Sites			
Hertfordshire County Council, Wheathampstead School, Wheathampstead, St Albans, Hertfordshire, Reference: 85/191 R, Status: Licence lapsed/cancelled/defunct/not applicable/surrendered, Cancelled, Positional Accuracy: Approximate location provided by supplier, Boundary Quality: Not Applicable, Contact Ref: 2	-	250-500m	W

Discharge Consents	Ref No.	Search Buffer	Direction
Discharge Consents			
Thames Water Utilities Ltd, Dyke Nurseries, Sewage Discharge, Reference: Temp.0875, Version: 1, Status: Temporary Consents (Water Act 1989, Section 113), Positional Accuracy: Located by supplier to within 100m, Contact Ref: 2	4	0-250m	NE
Thames Water Utilities Ltd, Dyke Nurseries, Sewage Discharge, Reference: Temp.0875, Version: 2, Status: Varied under EPR 2010, Positional Accuracy: Located by supplier to within 100m, Contact Ref: 2	4	0-250m	NE
Rarick Ltd, Beech Hyde Farm Buildings Dyke Lane Wheathamstead Herts AL4 8en, Sewage Discharge, Reference: Canm.0503, Version: 1, Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995), Positional Accuracy: Located by supplier to within 10m, Contact Ref: 2	5	250-500m	SE

Potentially Contaminative Uses	Ref No.	Search Buffer	Direction
Contemporary Trade Directory Entries			
Mermaid Pools Ltd, 78, Hilldyke Road, Wheathampstead, St. Albans, Hertfordshire, AL4 8TR, Swimming Pool Contractors, Repairers & Service, Status: Active, Positional Accuracy: Automatically positioned to the address	2	0-250m	NE
Four Star Domestic Appliance Repairs, 22, Smallwood Close, Wheathampstead, St. Albans, Hertfordshire, AL4 8TW, Washing Machines - Servicing & Repairs, Status: Inactive, Positional Accuracy: Automatically positioned to the address	6	0-250m	NE

Contaminants	Ref No.	Search Buffer	Direction
Potentially Contaminative Uses			
Contemporary Trade Directory Entries			
Lighting In Iron, 24, Nurseries Road, Wheathampstead, St. Albans, Hertfordshire, AL4 8TP, Wrought Ironwork, Status: Inactive, Positional Accuracy: Automatically positioned to the address	7	0-250m	N
Abiglaze, 20, Conquerors Hill, Wheathampstead, St. Albans, Hertfordshire, AL4 8NU, Plant & Machinery Repairs, Status: Inactive, Positional Accuracy: Automatically positioned to the address	8	250-500m	N

Miscellaneous	Ref No.	Search Buffer	Direction
BGS Recorded Mineral Sites			
Lower Beechhyde Farm Chalk Pit, , Darblay, Coleman Green, Wheathampstead, Hatfield, Hertfordshire, Status: Ceased, Reference: 166016, Positional Accuracy: Located by supplier to within 10m, Contact Ref: 3	-	250-500m	SE



General	Potentially Contaminative Use	Potentially Infilled Land
Site Boundary	Point Feature	Point Feature (High Risk)
Search Buffer	Area Feature	Point Feature (High Risk)
Bearing Reference Point	Area Feature (High Risk)	Area Feature (High Risk)
Reference Number	Line Feature	Line Feature (High Risk)
	Line Feature (High Risk)	Line Feature (High Risk)

Contaminants	Ref No.	Search Buffer	Direction
Potentially Contaminative Uses			
Historical Tanks And Energy Facilities			
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1982	9	0-250m	NE
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1980 - 1983	10	0-250m	NW
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1987	11	0-250m	NE
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1971 - 1983	12	250-500m	NW
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1975	13	250-500m	SE
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1971 - 1983	-	250-500m	NW
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1971 - 1987	14	250-500m	NE
Potentially Contaminative Industrial Uses (Past Land Use)			
Electricity production & distribution [inc large transformers], Date of Mapping: 1981	15	250-500m	SE
Quarrying of sand & clay, operation of sand & gravel pits, Date of Mapping: 1884	-	250-500m	SE

Potentially Infilled Land	Ref No.	Search Buffer	Direction
Potentially Infilled Land (Non-Water)			
Unknown Filled Ground (Pit, quarry etc), Date of Mapping: 1981	-	250-500m	SE
Potentially Infilled Land (Water)			
Unknown Filled Ground (Pond, marsh, river, stream, dock etc), Date of Mapping: 1960	1	0-250m	E
Unknown Filled Ground (Pond, marsh, river, stream, dock etc), Date of Mapping: 1960	16	0-250m	NW
Unknown Filled Ground (Pond, marsh, river, stream, dock etc), Date of Mapping: 1960	17	250-500m	SE

Map Details

The following maps have been analysed for Historical Tanks and Energy Facilities

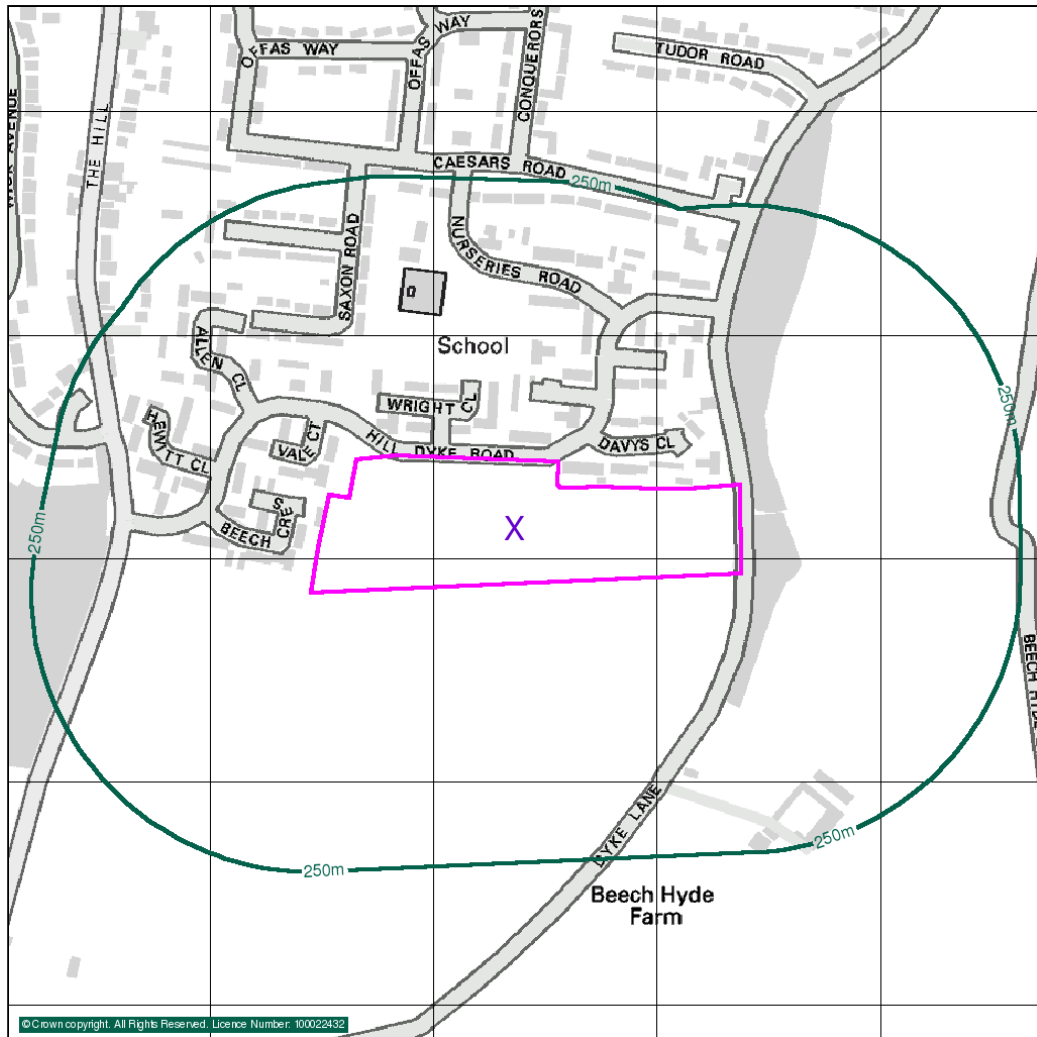
1:2,500	Mapsheet	Published
Ordnance Survey Plan	TL1713	1971
Ordnance Survey Plan	TL1813	1971
Ordnance Survey Plan	TL1713	1980
Ordnance Survey Plan	TL1813	1982
Ordnance Survey Plan	TL1713	1983
Ordnance Survey Plan	TL1813	1987

The following maps have been analysed for Potentially Contaminative Uses and Potentially Infilled Land information

1:10,000	Mapsheet	Published
Ordnance Survey Plan	TL11SE	1981

1:10,560	Mapsheet	Published
Hertfordshire	028_00	1884
Hertfordshire	028_SW	1899
Hertfordshire	028_SW	1925
Hertfordshire	028_SW	1949
Ordnance Survey Plan	TL11SE	1960

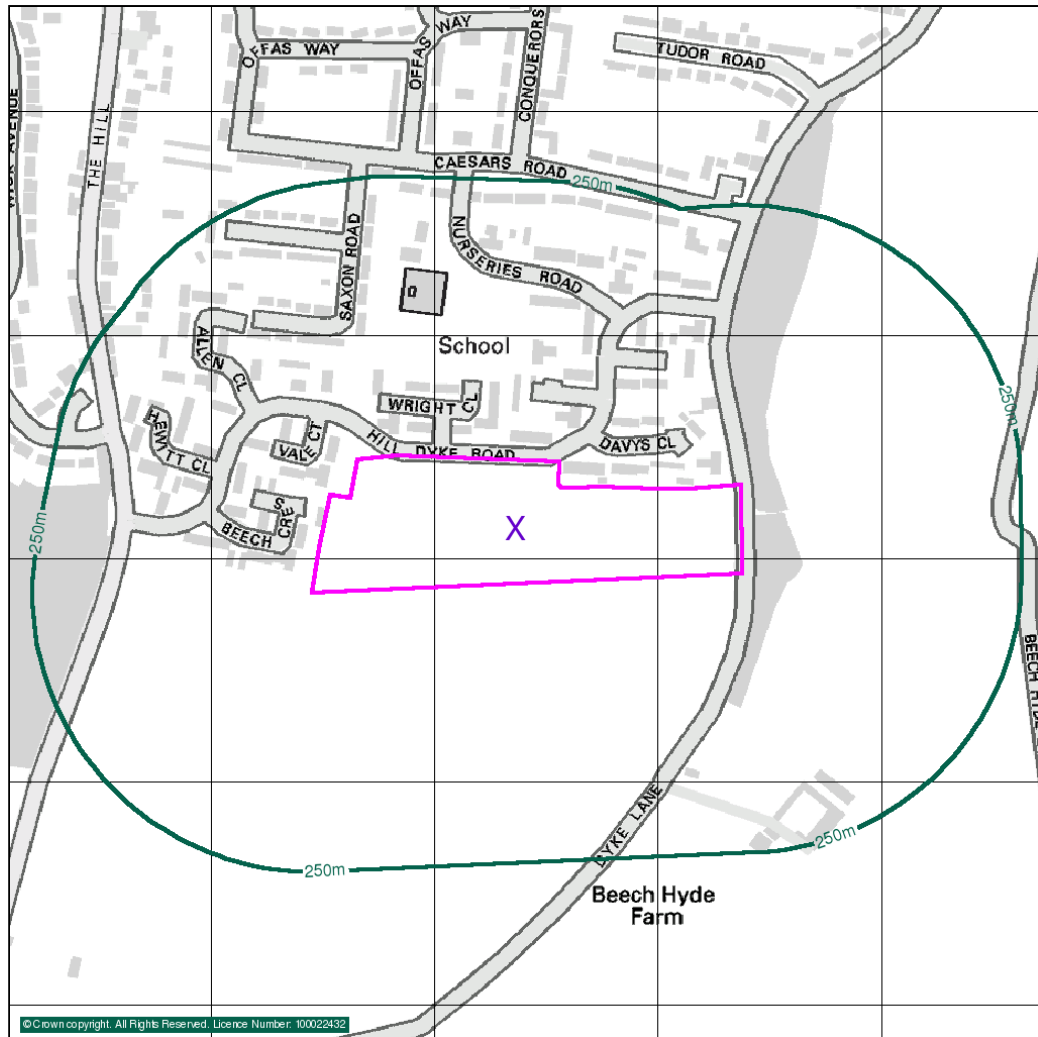
Flood Map



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General		Area of Floodplain	
Site Boundary	Areas Benefiting from Flood Defences	Extreme Flooding from Rivers or Sea without Defences (Zone 2)	
Search Buffer	Flood Water Storage Areas	Flooding from Rivers or Sea without Defences (Zone 3)	
Bearing Reference Point	Flood Defences		
Reference Number			

Sensitivity Map



General	Environmentally Sensitive Land Use	Protected Countryside Areas
Site Boundary	Area of Outstanding Natural Beauty	Forest Park
Search Buffer	Environmentally Sensitive Area	National Park
Bearing Reference Point	Local Nature Reserve	National Scenic Area
Reference Number	Marine Nature Reserve	
	National Nature Reserve	
	Ramsar Site	
	Site of Special Scientific Interest	
	Special Area of Conservation	
	Special Protection Area	
	Nearest Surface Water Feature	
	Water Abstractions	

Pathways and Receptors	Ref No.	Search Buffer	Direction
Pathways			
Groundwater Vulnerability			
Geological Classification: Major Aquifer (Highly permeable) - These are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public water supply and other purposes, Soil Classification: Soils of Intermediate Leaching Potential (I1) - Soils which can possibly transmit a wide range of pollutants, Map Scale: 1:100,000, Map Name: Sheet 39 West London, Contact Ref: 2	-	On Site	SW
Drift Deposits			
Drift Deposit: Low permeability drift deposits occurring at the surface and overlying Major and Minor Aquifers are head, clay-with-flints, brickearth, peat, river terrace deposits and marine and estuarine alluvium, Contact Ref: 2	-	On Site	SW
Extreme Flooding from Rivers or Sea without Defences			
None	-		-
Flooding from Rivers or Sea without Defences			
None	-		-
Areas Benefiting from Flood Defences			
None	-		-
Flood Water Storage Areas			
None	-		-
Flood Defences			
None	-		-

Environmentally Sensitive Receptors	Ref No.	Search Buffer	Direction
Nearest Surface Water Feature			
None	-		-
Source Protection Zones			
Various, Reference: Not Supplied, Type: Zone III (Total Catchment): The total area needed to support the discharge from the protected groundwater source., Contact Ref: 2	-	On Site	SW
Nomansland, Reference: Th400, Type: Zone II (Outer Protection Zone): Either 25% of the source area or a 400 day travel time whichever is greater., Contact Ref: 2	-	0-250m	SW
Nomansland, Reference: Th400, Type: Zone I (Inner Protection Zone): Travel time of 50 days or less to the groundwater source., Contact Ref: 2	-	250-500m	SW

Other Factors	Search Buffer	Direction
Geological		
Brine Compensation Area		
No		-
Coal Mining Affected Areas		
In an area which may not be affected by Coal Mining		-
Natural Cavities		
Cavity Type: Sinkhole x 1, Solution Pipe x 1, Origin: Not Supplied Contact Ref: 4	0-250m	N
Non Coal Mining Areas of Great Britain		
Hazard Potential: Unlikely Contact Ref: 3	On Site	SW
Hazard Potential: Highly Unlikely Contact Ref: 3	0-250m	N
Radon Potential - Radon Affected Areas		
Affected Areas: The property is in a lower probability radon area, as less than 1% of homes are above the action level, Source: British Geological Survey, National Geoscience Information Service, Contact Ref: 3	On Site	SW
Radon Potential - Radon Protection Measures		
Radon Protection Measures: None, Source: British Geological Survey, National Geoscience Information Service, Contact Ref: 3	On Site	SW
Potential for Collapsible Ground Stability Hazards		
Hazard Potential: Very Low, Contact Ref: 3	On Site	SW
Potential for Compressible Ground Stability Hazards		
Hazard Potential: No Hazard, Contact Ref: 3	On Site	SW
Potential for Ground Dissolution Stability Hazards		
Hazard Potential: Moderate, Contact Ref: 3	On Site	SW
Hazard Potential: Very Low, Contact Ref: 3	0-250m	NE
Potential for Landslide Ground Stability Hazards		
Hazard Potential: Very Low, Contact Ref: 3	On Site	SW
Hazard Potential: No Hazard, Contact Ref: 3	0-250m	N
Potential for Running Sand Ground Stability Hazards		
Hazard Potential: Very Low, Contact Ref: 3	On Site	E
Hazard Potential: No Hazard, Contact Ref: 3	0-250m	SE

Other Factors	Search Buffer	Direction
Geological		
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
Hazard Potential: Low, Contact Ref: 3	On Site	SW
Hazard Potential: No Hazard, Contact Ref: 3	0-250m	N

Registered Landfill Sites

At present no complete national data set exists for landfill site boundaries, therefore a point grid reference, provided by the data supplier, is used for some landfill sites. In certain cases the point grid references supplied provide only an approximate position and can vary from the site entrance to the centre of the site. Where the exact position of the site is unclear, Landmark construct either a 100 metre or 250 metre "buffer" around the point to warn of the possible presence of landfill. The size of this "buffer" relates to the positional accuracy that can be attributed to the site. The "buffer" is shown on the map as an orange cross-hatched circle and is referred to in the map legend as Potential Landfill Buffer. Where actual boundaries are available, the landfill site area is shown on the map as a red diagonal hatched polygon and referred to in the map legend as Registered Landfill Site.

Local Authority Recorded Landfill Sites

Local Authority landfill data are sourced from individual local authorities that were able to provide information on sites operating prior to the introduction of the Control of Pollution Act (COPA) in 1974. Appropriate authorities are listed under Local Authority Landfill Coverage with an indication of whether or not they were able to make landfill data available. Details of any records identified are disclosed. You should be aware that if the local authority 'Had landfill data but passed it to the relevant environment agency' it does not necessarily mean that local authority landfill data is included in our other Landfill datasets. In addition if no data has been made available, for all or part of the search area, you should be aware that a negative response under 'Local Authority Recorded Landfill Sites' does not necessarily confirm that no local authority landfills exist.

Flooding

The Sitecheck report flood map plots all flood related features revealed within the search area as supplied by the relevant agency. However, to avoid confusion, the text entry in the body of the report only reveals the detail of the nearest feature in each flood data set. This is also reflected in the summary table where only a single entry is included to indicate the search buffer of the nearest occurrence.

Mining Instability Data

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The information in this Sitecheck Assess Report is derived from a number of statutory and non-statutory sources. While every effort is made to ensure accuracy, Landmark cannot guarantee the accuracy or completeness of such information or data, nor to identify all the factors that may be relevant. If you are a private individual using this report Landmark recommend that you discuss its contents in full with your professional advisor. It is essential to read this report in conjunction with the Product User Guide and your attention is drawn to the scope of the report section within this guide.

The Sitecheck Assess User guide is available free of charge from our website www.sitecheck.co.uk

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Contact Names and Addresses**1 Hertfordshire County Council County Development Unit**

County Hall
Hertford
Hertfordshire
SG13 8DN

Telephone
Fax

www.hertsdirect.org

2 Environment Agency National Customer Contact Centre (NCCC)

PO Box 544
Templeborough
Rotherham
S60 1BY

Telephone 506 506

Please note that the Environment Agency/SEPA have a charging policy in place for enquiries.

3 British Geological Survey Enquiry Service

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
Nottinghamshire
NG12 5GG

Telephone
Fax

www.bgs.ac.uk

4 Peter Brett Associates

Caversham Bridge House
Waterman Place
Reading
Berkshire
RG1 8DN

Telephone
Fax

www.pba.co.uk

5 St Albans City & District Council Environmental Health Department

Civic Centre
St Peters Street
St Albans
Hertfordshire
AL1 3JE

Telephone
Fax

www.stalbans.gov.uk

Other Contacts**Institution of Civil Engineering Surveyors**

26 Market Street
ALTRINCHAM
Cheshire
WA14 1PF

Telephone

www.ices.org.uk/ices.asp

The Association of Geotechnical and Geoenvironmental Specialists

Foreham Street
83 Copers
Cope Road
Beckenham
Kent
BR3 1NR

Telephone 020 86588212

www.ags.org.uk/

The Environmental Auditors Registration Association

Welton House
Limekiln Way
Lincoln
LN2 4US

Telephone

www.greenchannel.com/iea/earahome.htm

The Environmental Industries Commission

45 Weymouth Street
London
W1N 3LD

Telephone 020 79351675

www.eic-uk.co.uk/

The Institution of Civil Engineers

One Great George Street
Westminster
LONDON
SW1P 3AA

Telephone
Fax

www.ice.org.uk

The Royal Institution of Chartered Surveyors

12 Great George Street
Parliament Square
London
SW1P 3AD

Telephone 7000

www.rics.org.uk/

Argyll Environmental Ltd

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Imperial Way
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Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Landmark Information Group Ltd, Imperium, Imperial Way, Reading, Berkshire, RG2 0TD. Telephone: Fax No: email: which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered firms maintain compliance with the Code.

The Search Code:

- Provides protection for homebuyers, sellers, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom.
- Sets out minimum standards which firms compiling and selling search reports have to meet.
- Promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
- Enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Code will:

- Display the Code logo prominently on their search reports.
- Act with integrity and carry out work with due skill, care and diligence.
- At all times maintain adequate and appropriate insurance to protect consumers.
- Conduct business in an honest, fair and professional manner.
- Handle complaints speedily and fairly.
- Ensure that all search services comply with the law, registration rules and standards.
- Monitor their compliance with the Code.

COMPLAINTS

If you have a query or complaint about your search, you should raise it directly with the firm, and if appropriate ask for your complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if it finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details:

The Property Ombudsman Scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel:
Fax:
Email:

You can get more information about the PCCB from www.propertycodes.org.uk.

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

LANDMARK CONVEYANCING TERMS & CONDITIONS

Full Terms and Conditions can be found on the following link:

<http://www.landmarkinfo.co.uk/Terms/Show/432>

APPENDIX G

Asset Location Search



Tom Wilson
Wormald Burrows Partnership
12A-18A Hitchin Street
BIGGLESWADE
SG18 8AX

Search address supplied Land To The South Of
Hillydyke Road
Wheathampstead

Your reference N/A

Our reference ALS/ALS Standard/2012_2354310

Search date 13 November 2012

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk

[Thames Water Utilities Ltd](http://www.thameswater-propertysearches.co.uk)

Property Searches
PO Box 3189
Slough SL1 4WW

DX 151280 Slough 13

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E
I [www.thameswater-
propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)

Registered in England and Wales
No. 2366661, Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search



Search address supplied: Land To The South Of, Hilldyke Road, Wheathampstead,

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on _____ or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email:

Web: www.thameswater-propertysearches.co.uk

[Thames Water Utilities Ltd](http://www.thameswater-propertysearches.co.uk)

Property Searches
PO Box 3189
Slough SL1 4WW

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Registered in England and Wales
No. 2366661. Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search



Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

TL1713SE
TL1813SW

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

The following quartiles have not been printed as they are out of Thames' water catchment area. For details of the assets requested please contact

[Thames Water Utilities Ltd](#)

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Cleanwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search



the water company indicated below:

TL1713SE Veolia Water
TL1813SW Veolia Water

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ
Tel:

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

An invoice is enclosed. Please send remittance to Thames Water Utilities Ltd., PO Box 223, Swindon, SN38 2TW.

[Thames Water Utilities Ltd](#)

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Cleanwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search



Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel:

Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel:
Email:

Should you require any further information regarding budget estimates, diversions or stopping up notices then please contact:

DevCon Team
Asset Investment
Thames Water
Maple Lodge STW
Denham Way
Rickmansworth
Hertfordshire
WD3 9SQ

Tel: 898 072
Email:

[Thames Water Utilities Ltd](#)

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No. 2366661. Registered office
Clearwater Court, Vastern Road
Reading RG1 8DB

Asset Location Search



Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel:
Email:

[Thames Water Utilities Ltd](#)

Property Searches
PO Box 3189
Slough SL1 4WW

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Reading RG1 8DB



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 517750,213250

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. WU298557 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9401	114.69	112.4
8402	115.47	114.37
5301	118.94	115.91
5401	118.53	117.21
5402	118.48	116.99
5403	118.5	116.83
6400	118.56	115.5
6402	118.45	116.62
9304	112.69	111.38
9300	115.68	113.69
8301	115.95	113.82
9301	114.93	113.4
9303	114.23	113.39
9302	113.91	113.24
9306	114.31	113.6
9400	114.61	112.74
6200	118.88	116.58
6304	118.86	116.47
6300	118.9	116.29
6301	118.83	116.05
6302	118.88	116.36
6303	118.95	116.76
6401	118.46	114.49
6406	118.05	116.67
6407	117.88	116.44
7200	118.03	116.36
7307	117.97	115.84
7306	117.81	115.5
7305	117.6	114.69
7304	118.07	115.06
8300	116.43	114.2
7303	118.03	115.44
7300	118.3	117.49
7301	118.51	116.94
7302	117.49	115.99
6404	118.52	116.78
6405	118.54	116.44
8401	115.87	114.59
8400	116.49	115.2
8200	116.78	115.19
8202	116.76	114.57
8201	117.09	114.87
8204	116.24	113.98
8203	116.81	114.06
5400	119.23	116.64
5300	118.78	116.81

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 518250,213250
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available



















Manhole Reference	Manhole Cover Level	Manhole Invert Level
0400	112.05	110.06
0401	111.36	109.31
0301	110.19	109.01
0300	111.07	109.93
0302	110.05	108.84
0304	109.71	107.1
0303	110.42	108.5
1305	107.97	106.42
1310	108.93	107.57
1311	107.95	107.21
1312	107.9	107.06
1313	107.28	106.19
1306	107.92	106.28
1307	107.96	106.11
1308	107.3	105.89
1309	107.28	105.78
1303	106.9	105.17
1301	108.32	106.95
1302	108.15	106.71
1300	108.67	107.22
1402	109.29	107.71
1403	108.76	107.46
1400	109.36	108.2
1401	109.34	107.95
1405	n/a	n/a
1304	106.65	104.71
1201	106.64	105.6
1202	106.32	105.29
1404	108.66	107.42
2400	108.35	107.23
2411	106.94	106.12
2200	106.1	104.88
2401	108.37	107.18
2402	108.32	106.74
2201	106.11	104.72
2403	108.28	106.66
2404	107.84	106.42
2308	105.12	103.28
2410	106.86	105.37
2307	105.16	103.31
2405	107.65	106.24
2303	105.03	103
2302	105.11	103.4
2306	105.17	103.48
2406	107.65	106.14
2301	105.37	103.61
2305	105.18	103.62
2407	107.6	105.7
2304	105	102.91
2408	107.6	105.65
2300	105.67	103.95
2409	107.1	105.17
2202	106.17	104.15
1200	107.03	105.99

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.








ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

-  **Foul:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
-  **Surface Water:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
-  **Combined:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
-  Trunk Surface Water
-  Trunk Foul
-  Storm Relief
-  Trunk Combined
-  Vent Pipe
-  Bio-solids (Sludge)
-  Proposed Thames Surface Water Sewer
-  Proposed Thames Water Foul Sewer
-  Gallery
-  Foul Rising Main
-  Surface Water Rising Main
-  Combined Rising Main
-  Sludge Rising Main
-  Proposed Thames Water Rising Main
-  Vacuum





Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

-  Air Valve
-  Dam Chase
-  Fitting
-  Meter
-  Vent Column




Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

-  Control Valve
-  Drop Pipe
-  Ancillary
-  Weir





End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

-  Outfall
-  Undefined End
-  Inlet






Other Symbols

Symbols used on maps which do not fall under other general categories








-  Public/Private Pumping Station
-  Change of characteristic indicator (C.O.C.I.)
-  Invert Level
-  Summit

Areas

Lines denoting areas of underground surveys, etc.

-  Agreement
-  Operational Site
-  Chamber
-  Tunnel
-  Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

-  Foul Sewer
-  Surface Water Sewer
-  Combined Sewer
-  Gully
-  Culverted Watercourse
-  Proposed
-  Abandoned Sewer

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 800.

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to him at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

By Credit Card	By Post	By BACS Payment	Telephone Banking	By Swift Transfer
Please call quoting your invoice number starting CBA or ADS.	Cheque only, made payable to 'Thames Water Utilities Ltd' writing your Thames Water account number on the back. Please fill in the payment slip below and send it with your cheque to Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW	Direct to our bank on account number 90478703, sort code 60-00-01 may be made. A remittance advice must be sent to Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. Or email ater.co.uk	By calling your bank and quoting your invoice number and the Thames Water's bank account number 90478703 and sort code 60-00-01	You may make your payment via SWIFT by quoting NWBKGB2L together with our bank account number 90478703, sort code 60-00-01 and invoice number

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel:
Fax:
Email:

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

APPENDIX H

12a -18a Hitchin Street
Biggleswade
SG18 8AX



Date 09/04/2013 15:07
File

Designed by michael
Checked by

Micro Drainage

Source Control 2013.1

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.150
Area (ha)	3.510	Urban	0.000
SAAR (mm)	700	Region Number	Region 5

Results 1/s

QBAR Rural 1.4
QBAR Urban 1.4

Q100 years 5.1

Q1 year 1.2
Q30 years 3.4
Q100 years 5.1

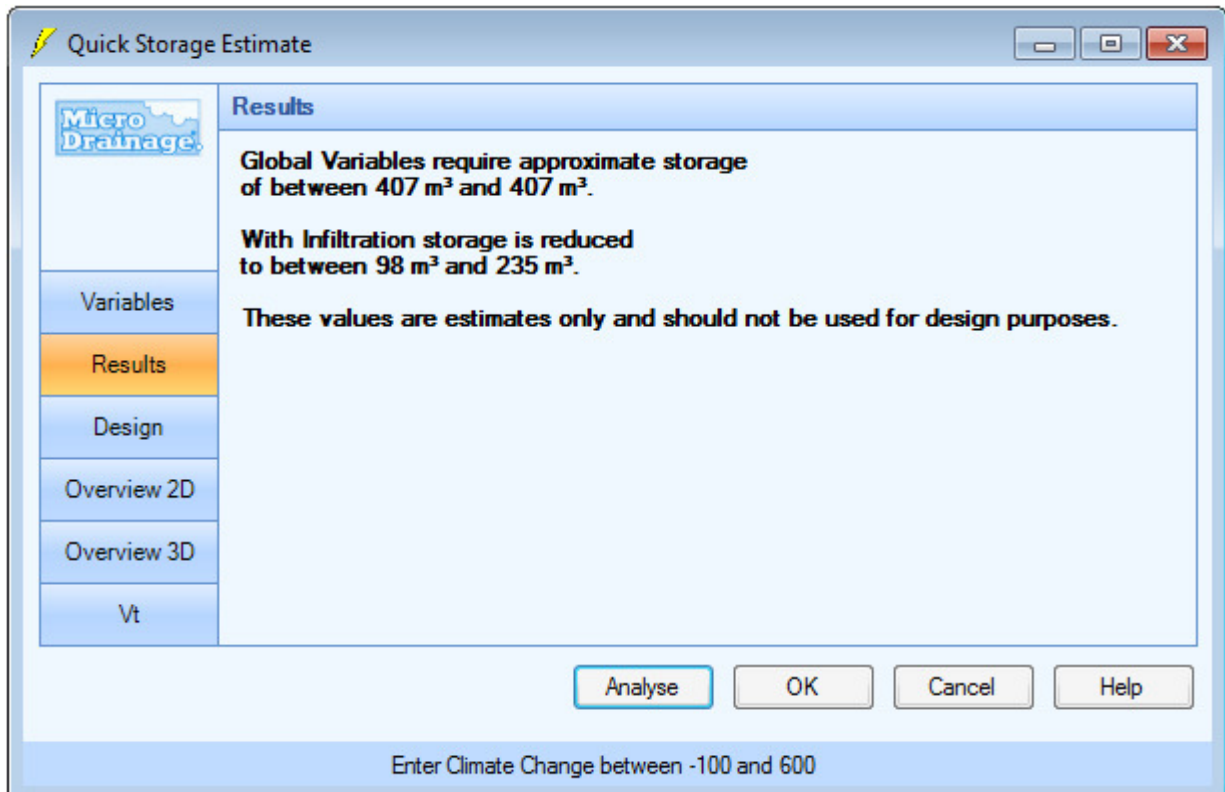


Table 1: Balacning Pond and Swale Storage from Roads

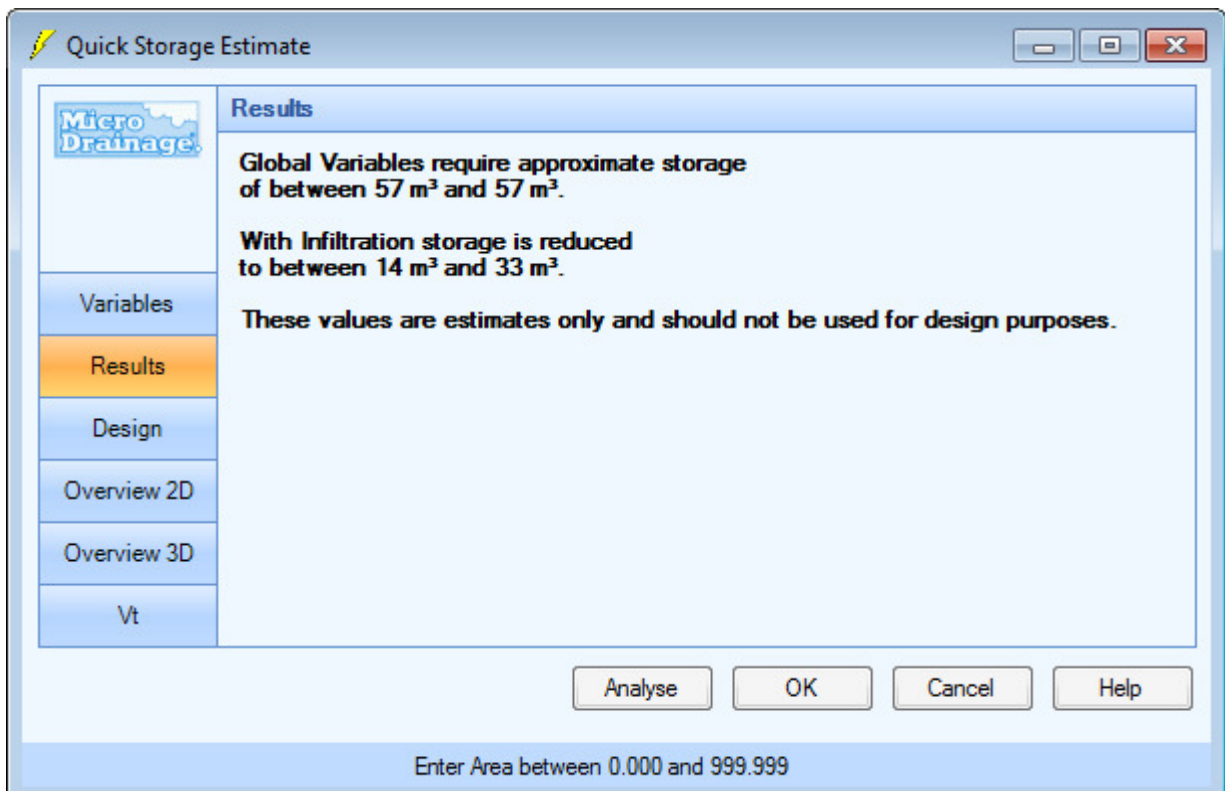


Table 2: SAI housing storage

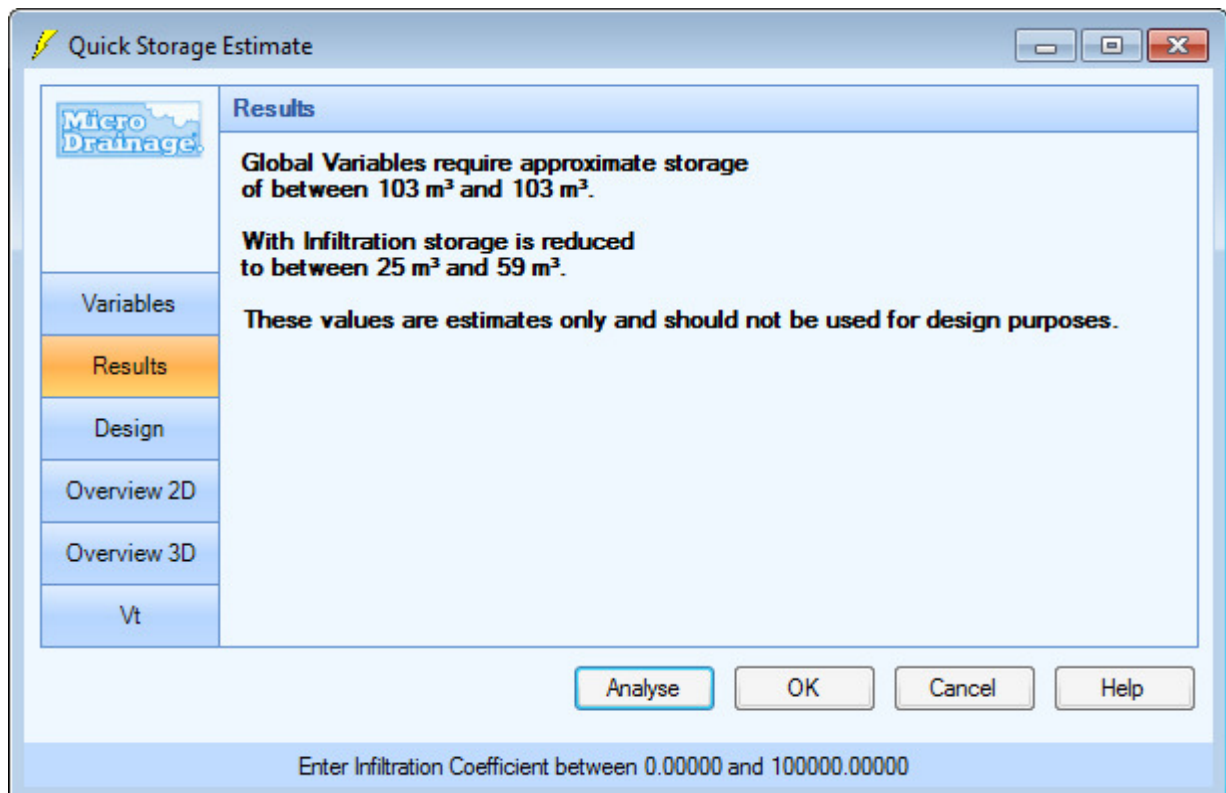


Table 3: SA2 housing Storage

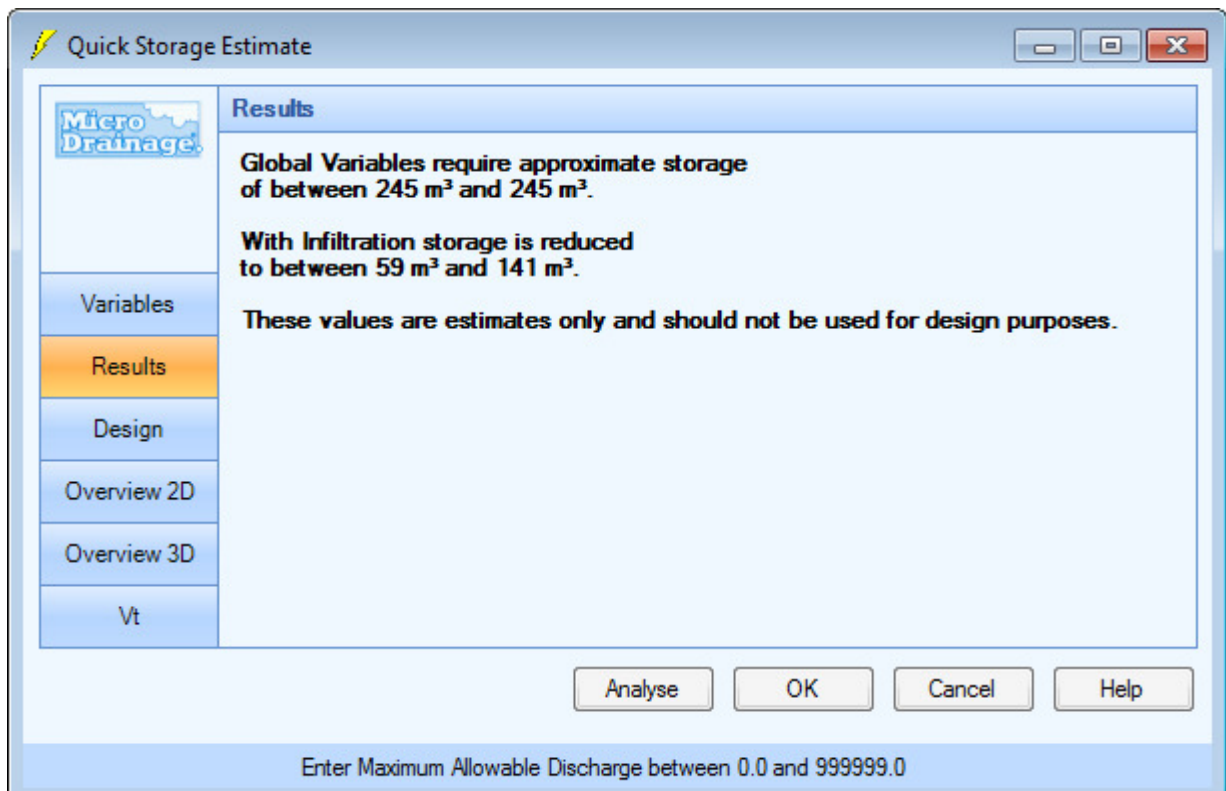


Table 4: SA3 housing Storage

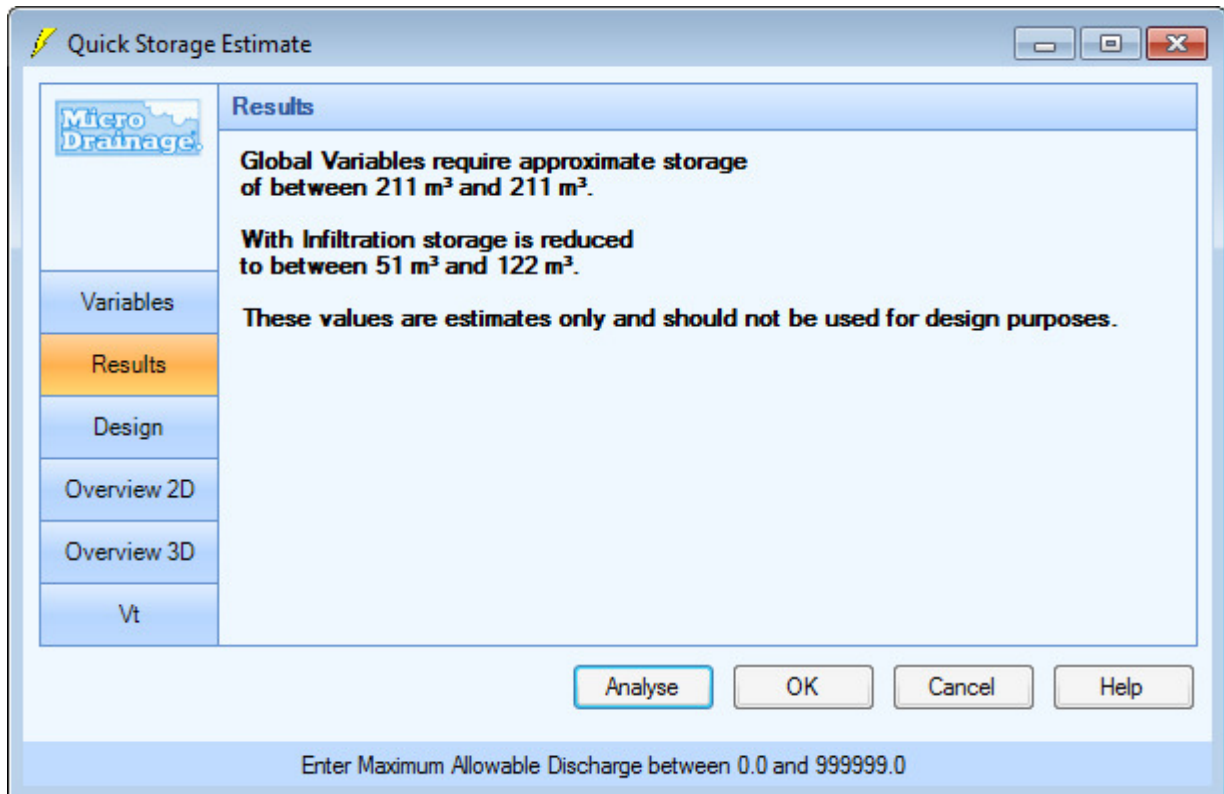


Table 5: SA4 housing Storage

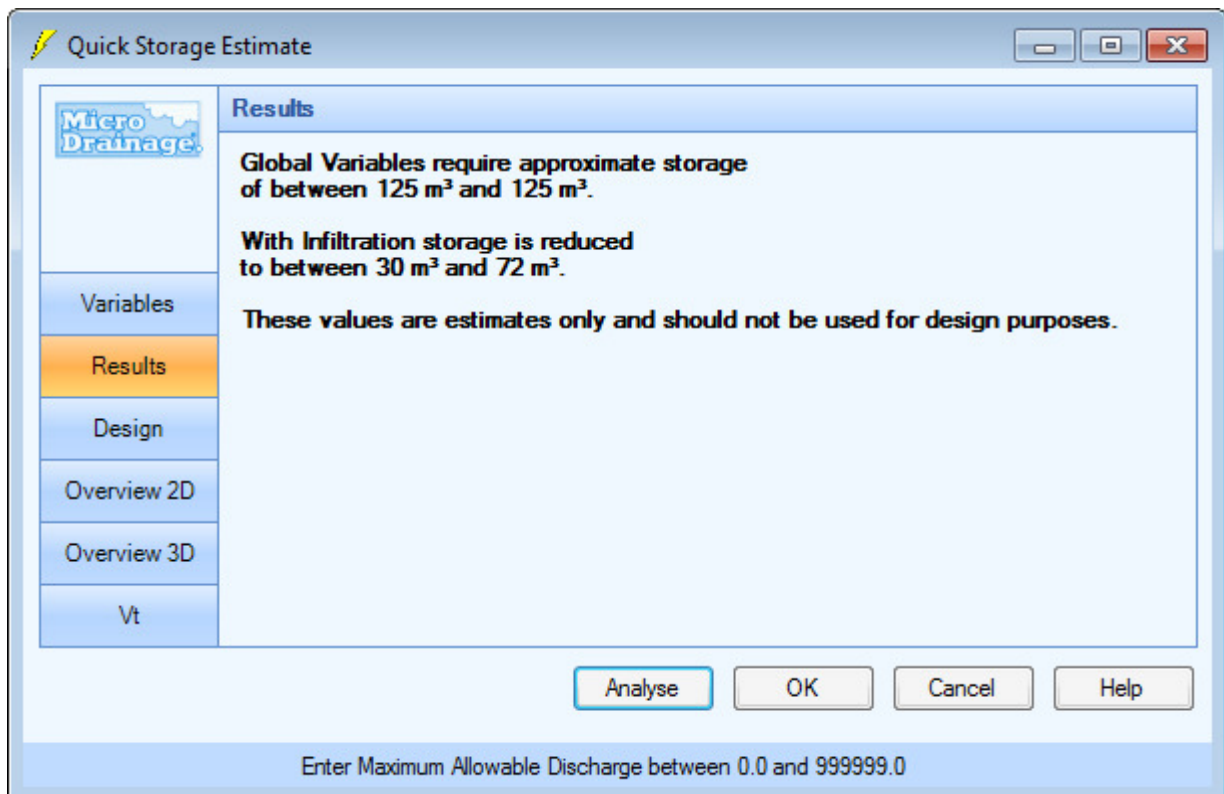


Table 6: SA5 housing Storage

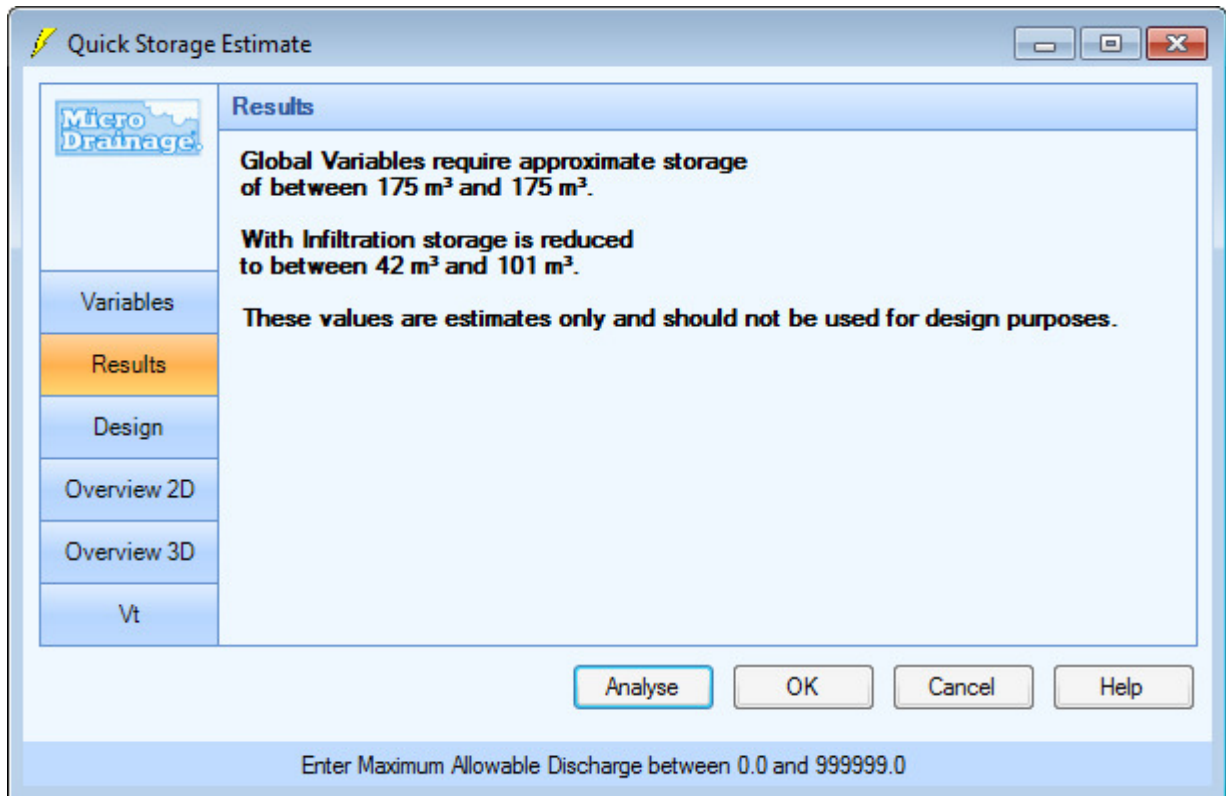


Table 7: SA6 housing Storage

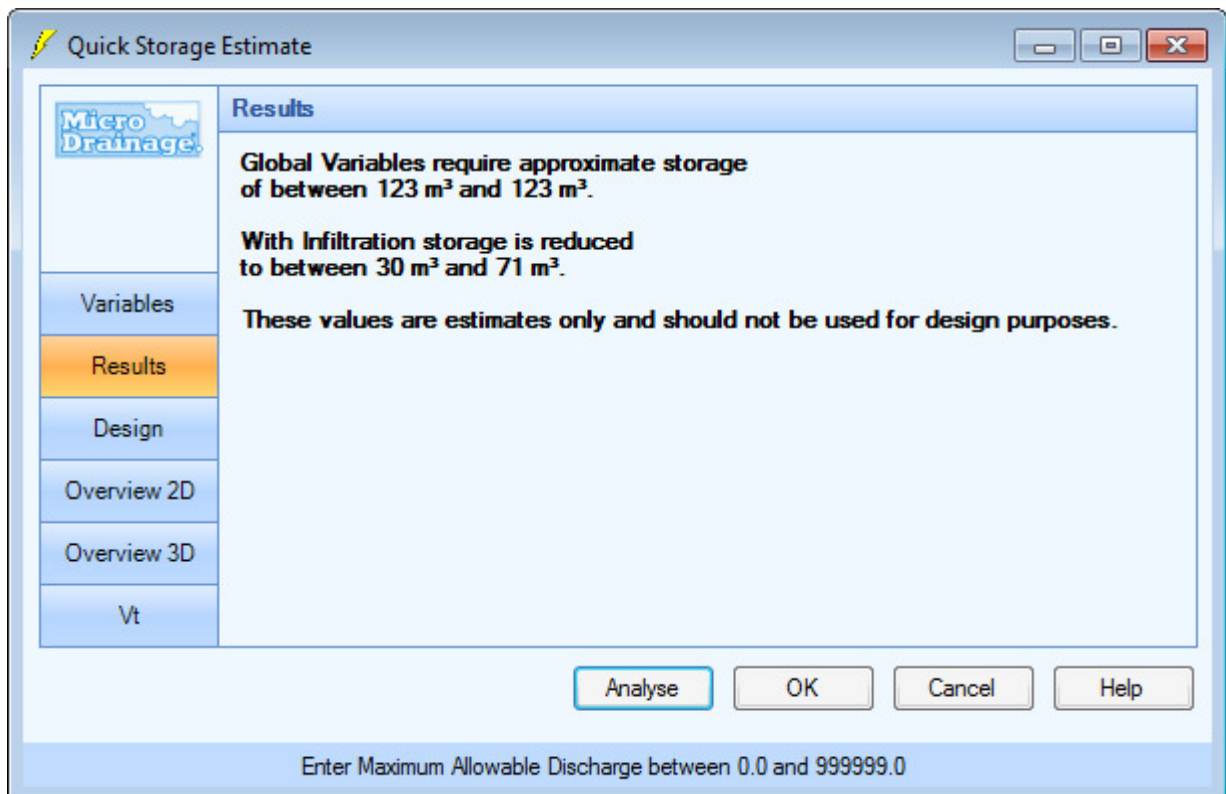


Table 8: SA7 housing Storage

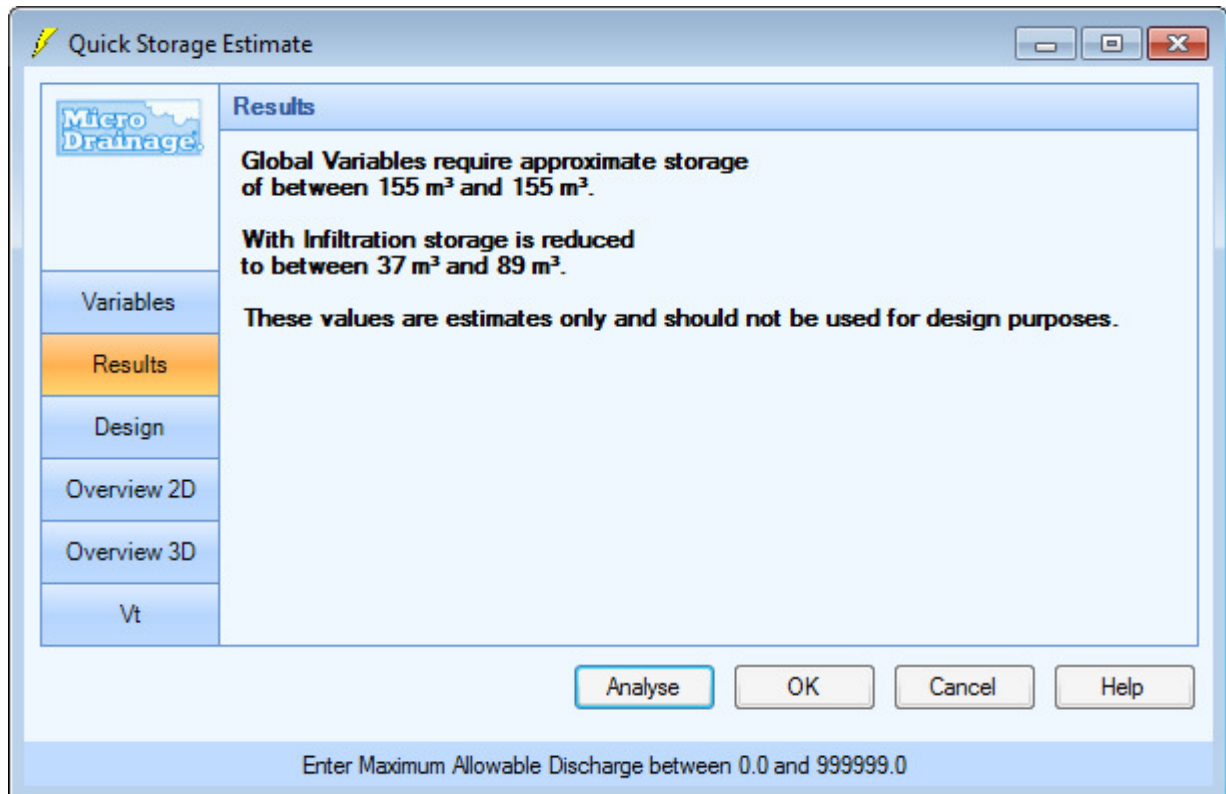


Table 9: SA8 housing storage

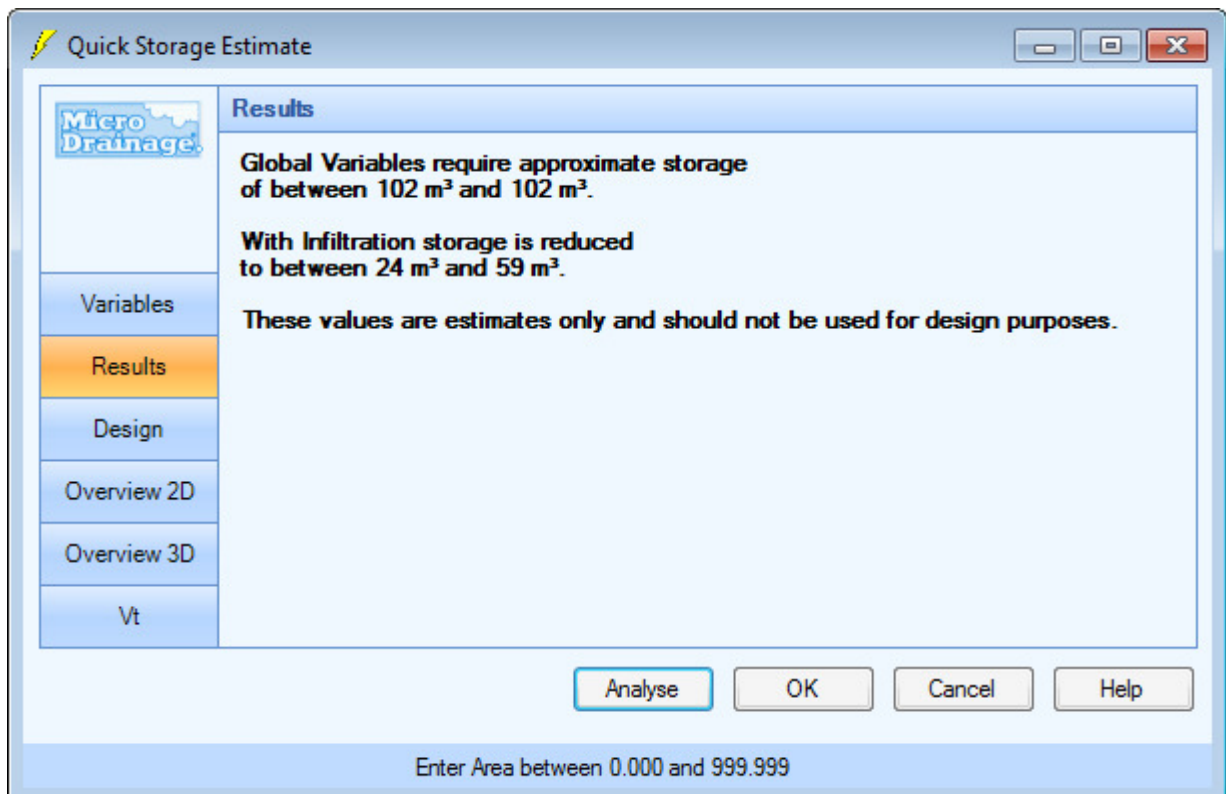


Table 10: SA9 housing Storage

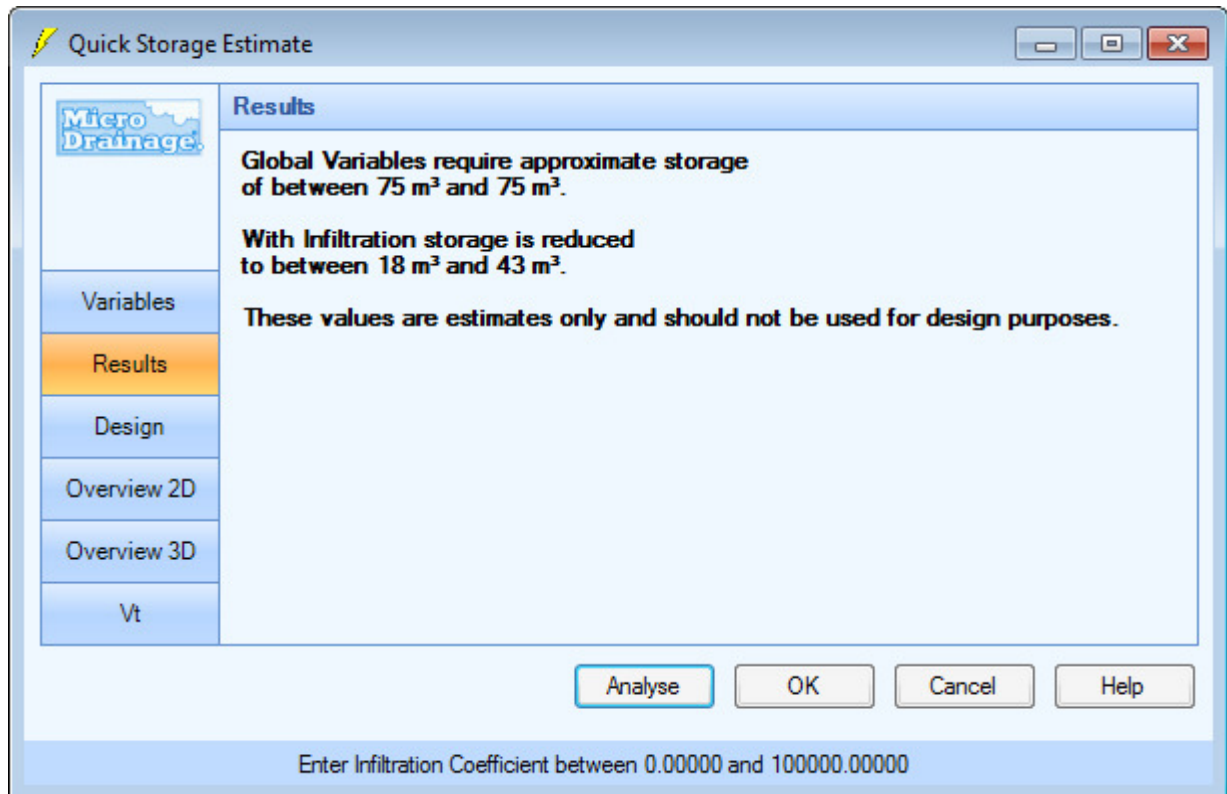


Table 11: SA10 housing storage

APPENDIX I