



**TIER I DESKTOP STUDY REPORT**  
**Weston Homes Plc**  
**Bishops Stortford Golf Club, Dunmow Road, Bishops Stortford,**  
**Hertfordshire**

**Project Reference:**

CON1-BISH-023 – Bishops Stortford Golf Club; Tier I Desktop Study

**Site Address:**

Bishops Stortford Golf Club,  
Dunmow Road,  
Bishops Stortford,  
Hertfordshire,  
CM23 5HP

**Report Date:**

25<sup>th</sup> July 2014

**Version Number:**

Version 1

**Customer:**

Weston Homes Plc  
The Weston Group Business Centre  
Parsonage Road  
Takeley  
Essex  
CM22 6PU

**Prepared By:**

Stansted Environmental Services Ltd  
The Stansted Centre  
Parsonage Road  
Takeley  
Essex  
CM22 6PU



---

**DOCUMENT CONTROL**

**Publication Title** Tier I Desktop Study Report  
Bishops Stortford Golf Club, Bishops Stortford

**Volume Number** Volume 1 of 1

**Version** 1

**Date** 25<sup>th</sup> July 2014

**Project Reference** CON1-BISH-023 – Bishops Stortford Golf Club,  
Bishops Stortford; Tier I Desktop Study

---

**Prepared By**

**Basil Fagg**  
FGS  
**Health, Safety & Environment Consultant**

Basil Fagg has 15 years experience in the site investigation and remediation industry incorporating such disciplines as contaminated land, geotechnics, asbestos and ecology.

---

**MIRSM, MIOA, RMAPS, Grad IOSH, Grad CIEH**  
**Health, Safety & Environment Manager**

Silvio Petrasso has been undertaking contaminated land investigations as part of brownfield land redevelopments for 10 years, as well as offering other construction related consultancy services

---

**Approved By**

**John Carpenter** BSc, MCIEH, CMIOSH, MIOA, RMAPS  
**Managing Director of Stansted Environmental Services Ltd**

John Carpenter is a Chartered Member of the Chartered Institute of Environmental Health and has extensive experience in dealing with contaminated land

---

**Issue Status** Final – Version 1

**Date** 25<sup>th</sup> July 2014

---

This page is intentionally blank.

---

**Contents**

**EXECUTIVE SUMMARY**

7

**1. INTRODUCTION**

8

**2. SITE DESCRIPTION**

9

**3. DESK STUDY**

11

**4. RISK ASSESSMENT**

21

**5. SAMPLING STRATEGY**

24

**6. CONCLUSIONS**

25

**7. APPENDICES**

27

**APPENDIX 1 – LANDMARK ENVIROCHECK REPORT**

**APPENDIX 2 – HISTORICAL MAPS**

**APPENDIX 3 – GEOLOGY MAPS**

**APPENDIX 4 – GROUNDWATER VULNERABILITY MAPS**

**APPENDIX 5 – SITE SENSITIVITY MAPS**

**APPENDIX 6 – PROPOSED SAMPLING LOCATION PLAN**

**APPENDIX 7 – SITE WALKOVER CHECKLIST**

This page is intentionally blank

## EXECUTIVE SUMMARY

Stansted Environmental Services Ltd has been commissioned by Weston Homes Plc to undertake a desktop study at the land known as Bishops Stortford Golf Club, Dunnow Road, Bishops Stortford, Hertfordshire, CM23 5HP.

The purpose of the study is to evaluate the contamination status at the site and to address any future Planning Conditions relating to contamination that may arise as part of a planning application.

Geological maps show the site underlain by Superficial Deposits of the Lowestoft Formation – Diamicton. The Bedrock Geology is indicated as the London Clay Formation with the Thanet Sand Formation and Lambeth Group (undifferentiated) present to the southwest.

The Superficial deposits and Bedrock deposits beneath the site are classified as Unproductive Strata. A Secondary A Aquifer was present within the Bedrock deposits to the southwest of the site.

The nearest Water Abstraction point is located at the Stansted Green Services at a distance of 795m to the northeast of the site, which is for mixed use, including drinking. The site is not within a Source Protection Zone.

Historically the site has been used as a golf course since the 1920s. A railway line (now dismantled) running atop an embankment, formed the southern site boundary.

The historical maps indicate that the site was located in a largely agricultural setting, with increased residential development of Bishops Stortford to the west, throughout the study period.

Limited intrusive sampling is recommended due to the presence of the former railway to the south and a sampling strategy has been prepared to take these works forward.

Fieldwork will involve soil sampling from a number of shallow trial pits to identify any contamination from the identified previous uses.

The development of the site, including any necessary remediation works, will effectively remove any potential pollution linkages making it suitable for residential development.

## **1. INTRODUCTION**

This document forms the desktop study into the site conditions at the land known as Bishops Stortford Golf Club, Dunmow Road, Bishops Stortford, Hertfordshire, CM23 5HP and was undertaken for Weston Homes PLC. It is the intention for part of the site to be redeveloped to provide residential accommodation with associated car parking, private gardens and landscaped areas. The exact layout of the proposed development was not forwarded to Stansted Environmental Services Ltd.

The site is located at national grid reference 550520,221280.

### **1.1 Planning Conditions**

No planning application has been made with respect to the proposed scheme at the time of writing of this report. It is intended that this report will form part of the initial planning application submission.

### **1.2 Project Objectives**

The overall objective will be to provide satisfactory evidence to the Local Planning Authority in order to be in a position to discharge any future Planning Condition relating to contamination.

In line with current planning guidance, the Tier 1 Desk Study methodology has been broken down into component parts so as to enable a targeted approach for a contamination study to be carried out.

The specific objectives of the investigation have been:

- To obtain historical information concerning potentially contaminating previous uses of the site.
- To obtain information relating to geology and hydrogeology of the site, thus being able to identify and assess possible pollution linkages.
- To analyse and comment on information contained in previous studies.
- To assess the risks and to compile a Conceptual Model for the site.
- To prepare an intrusive sampling proposal plan for approval by the Local Planning Authority.
- To obtain discharge of the Desk Study part of any future Planning Condition relating to contamination.



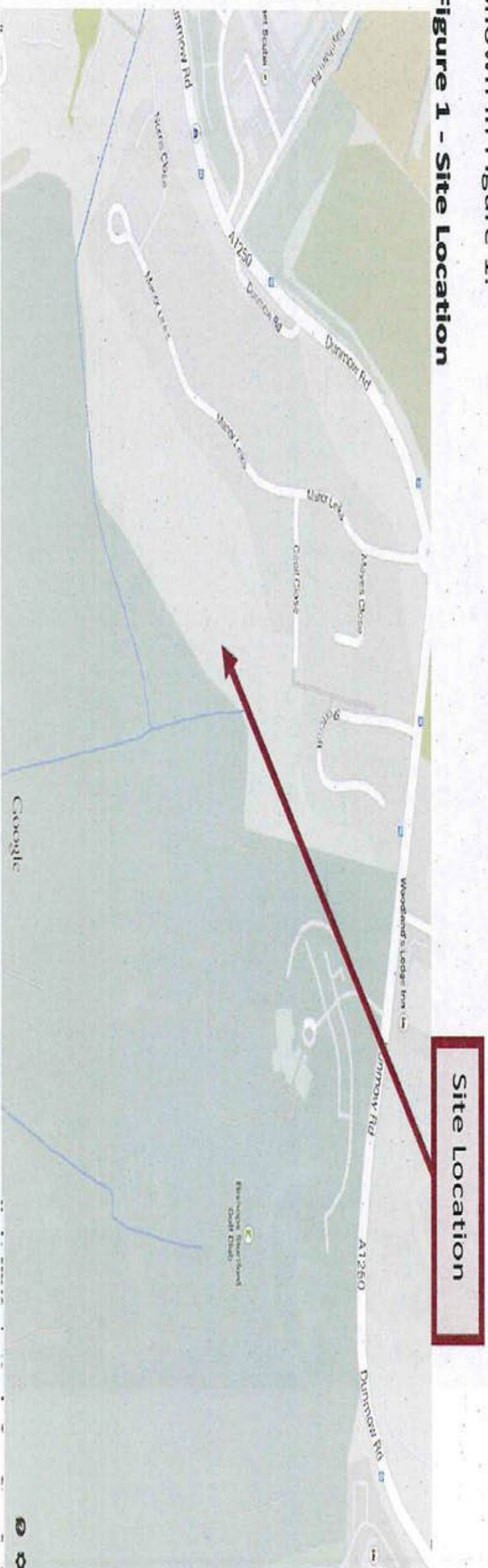
## 2. SITE DESCRIPTION

### 2.1 Site Location

The site is located at the western side of Bishops Stortford Golf Club, Dunmow Road, Bishops Stortford, Hertfordshire, CM23 5HP.

The site is approximated by the National Grid reference 550520,221280. The site location is shown in Figure 1.

**Figure 1 - Site Location**



The site was located along the western edge of Bishops Stortford Golf Club course, to the rear of the properties along Manor Links. The area where the site was located was residential to the north and west and agricultural beyond the golf course to the south and east.

### 2.2 Site Description

The site was roughly triangular in shape, covered an area of approximately 5Ha and was split into two development areas (see figure 2 below). The Area 1 land was closest the western boundary of the golf course and comprised rough, scrubby, heavily vegetated, unkept land. Within it was evidence of bonfires, presumably from vegetation clearance. Furthermore some small excavations, with resultant spoil heaps were also present within this area, although it was not obvious as to their purpose (possible uses could be former golf course features, e.g. bunkers, or to aid site drainage - they contained standing water). The soils exposed were disclosed as gravelly sandy clays. The Area 2 land was set to grass and was partly used as the course's driving range. A wooded area was also present in the northern part of Area 2, along with golf course drains noted in the southern part. A vegetated former railway embankment formed the southern boundary of the study area, mostly beside Area 2, and was approximately 3 metres high.

The site is accessed via the main golf course car park, but two vehicular accesses exist from Manor Links. The current site layout is shown in Figure 2.

Figure 2 - Current Site Layout



### **3. DESK STUDY**

A desk top study has been undertaken using available sources of information, including an Envirocheck report obtained from Landmark Information Group (a copy of which is contained in Appendix 1), a review of published geological and hydro-geological maps, a search of the Environment Agency web-site. SES have not been provided details of any previous phases of works at the site or made any preliminary enquiries with the Local Authority.

#### **3.1 Environmental Setting**

The following information has been obtained to adequately assess the environmental setting of the site, which will enable any contamination issues to be suitably assessed.

##### **3.1.1 Geology & Hydrogeology**

As discussed above, the site geology has been determined from published geological maps of the locality. Geological maps show the site underlain by Superficial Deposits of the Lowestoft Formation – Diamicton. The Bedrock Geology is indicated as the London Clay Formation with the Thanet Sand Formation and Lambeth Group (undifferentiated) present to the southwest. Although not indicated as such, there is the possibility for other Superficial Deposits to be present above the Bedrock formations. A copy of the Envirocheck geology maps can be found in Appendix 3.

The Superficial deposits and Bedrock deposits beneath the site are classified as Unproductive Strata. A Secondary A Aquifer was present within the Bedrock deposits to the southwest of the site.

A Secondary A Aquifer is defined as permeable layers capable of supporting water supplies at a local, rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;

Unproductive Strata are defined as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The site is not within a Source Protection Zone.

Groundwater vulnerability data is not available for the site. The area to the south of the site is classified by the EA as being a minor-aquifer and has soils of intermediate leaching potential.

Soils of Intermediate Leaching Potential are classified as soils which have a moderate ability to attenuate diffuse source pollutants or in which it is possible that some non-absorbed diffuse source pollutants and liquid discharges could penetrate the soil layer.

Further information regarding groundwater vulnerability, source protection zones and sensitive land uses maps can be found in Appendix 4 of this report.

### **3.1.2 Hydrology**

The nearest surface water features are the golf course ditches, classified as tertiary rivers, located on-site. A secondary river is located to the north of the site.

The nearest Water Abstraction point is located at the Stansted Green Services at a distance of 795m to the northeast of the site which is for mixed use, including drinking. There are a further 12 abstractions with 2km.

There are 18 recorded discharge consents within 1km of the site. The nearest discharge consent (revoked) is located at Gade Valley Cottages, for surface water discharges, 250m to the west.

There are 29 recorded incidents to controlled waters held by the Environment Agency within 1km of the site, although none are within 500m. The closest was recorded 562m to the west for unknown sewage and was classified as a Category 3 – Minor Incident.

There are 3 recorded Substantiated Pollution Incidents, the closest, 614m to the northwest of the site, was for a Category 2 - Significant Incident of oils/fuels to water.

### **3.1.3 Ecology**

There are no areas in the vicinity that are classified as a Site of Special Scientific Interest (SSSI). Nesting birds were observed on site within the more densely vegetated (wooded) parts of the site.

### **3.1.4 Landfill Sites**

There are no recorded landfill sites in the site's vicinity

A Licensed Waste Management Facility is recorded as being 500m to the northeast of the site at Woodside, Bishops Stortford which is used as a Household Waste Amenity Site and appears to still be in operation.

### **3.1.5 Ground Workings**

The former Bishops Stortford brickworks was located 438m to the southwest of the site.

### **3.1.6 Radon Affected Areas**

The property is not within a radon affected area, as less than 1% of homes are above the action level. As such, no radon protection measures are necessary in the construction of new dwellings or extensions.

### **3.1.7 Fuel Sites**

An operation fuel filling station was located 698m to the east of the site

### 3.1.8 Vulnerability of the Site to Contamination

The sensitivity of each of the identified receptors in the vicinity of the site to contamination along with pathways from the site are summarised in Table 1.

**Table 1; Sensitivity of Environmental Receptors in the Vicinity of the Site**

Receptor Type	Receptor(s)	Sensitivity	Reasoning
Groundwater	Nearby Secondary A aquifer	Low	Site underlain by Unproductive Strata within the Superficial and Bedrock Deposits limiting migration of potential contaminants
Surface water	Nearst surface water feature	Mod	On site ditches
Soils	Construction workers and end users	Mod	Construction workers may come into contact with potential contaminants during the groundworks phase of the development. Private gardens are also proposed for the houses.
Ecological	N/A	N/A	There are no local SSSIs or other sensitive sites in the vicinity.

Definition of Risk Ratings:

**High:** Harm is likely to arise from an identified hazard without appropriate remediation.

**Mod:** It is possible that without appropriate remediation some harm may come to a receptor. It is unlikely to be severe in nature.

**Low:** It is possible that without suitable remediation harm could come to a receptor. However even if worst case scenario harm would be relatively mild.

Site Sensitivity Maps are attached as Appendix 5.

### 3.1.9 Walkover survey

A walkover survey was undertaken of the premises on the 21st July 2014, and the important findings are recorded below. A copy of the Site walkover checklist is attached as Appendix 7.

#### 3.1.9.1 Current land use

The land was currently part of the Bishops Stortford Golf Course. The Area 1 land was largely unkept and overgrown, whilst the Area 2 land was maintained grass.

Access to the site was via the main golf course car park. Two locked gates also gave vehicular access from Manor Links.



The photographs above show general views of the Area 1 land including one of the accesses from Manor Links



The above photographs show the shallow excavations and the evidence of bonfires.



The above photographs show general shots of the Area 2 land.



**The above photographs show the golf course drains crossing the study area and the heavily vegetated former railway embankment.**



### 3.1.9.2 Asbestos Containing Material

There was no evidence of asbestos containing materials noted on site during the walkover.

### 3.1.9.3 Results of walkover survey

The potential sources of contamination from the sites previous use as identified from the walkover survey are summarised below;

**Table 2; Findings of walk-over survey**

Source	Receptor	Description	Risk
Made ground including ash, clinker and coal from the railway embankment	Future residents and construction workers	Potential for contaminated material to be present which would present a risk to future site occupants in soft landscaped areas e.g. gardens, without subsequent remediation. With respect to site construction workers; a safe system of work will be required if contamination is confirmed to be present.	Moderate

### 3.1.9 Previous Studies

No previous environmental studies were forwarded to SES as part of this investigation.

## 3.2 Historical Information

### 3.2.1 Sources of Information

The historical development of the site has been traced by consulting Ordnance Survey maps from the first edition to the present day, older maps from web-based archives and current site layouts. Historical maps are contained within Appendix 2 of this report.

### 3.2.2 Summary of Development

The 1876 1:2500 map shows the site and its surroundings as undeveloped agricultural land.

The 1883 1:10560 and 1891 1:2500 maps show construction of the Great Eastern Railway 20m south of the site.

The 1898 1:10560 and 1891 1:2500 maps show excavation of a brick pit and works 300m to the southwest of the site.

The 1923 1:10560 and 1921 1:2500 maps show the site to be used as a golf course. The brick works appears no longer operational

The maps throughout the middle decades of the 20<sup>th</sup> century show increased residential development of Bishops Stortford to the west, as well as along Dunmow Road to the north and west.

The 1960 1:10560 map shows an industrial building, with railway sidings, located 400m to the west of the site.

The 1982 1:1250 and 1982 1:10000 map shows the railway line as dismantled and construction of the M11, 750m to the east. Additional buildings, indicated as depots were located within the vicinity of the aforementioned industrial buildings (sidings now lifted), itself indicated as an engineering works.

The 1988 1:1250 and 1992 1:10000 map shows construction of Manor Links with its associated housing. Further residential development of Bishops Stortford was shown to the west.

The 2014 mapping shows the site and its vicinity largely unchanged.

**Table 3; Chronology of Site**

Map Date	Observation
1876	Site is open agricultural land.
1883	Railway line built close to southern site boundary
1898	Brickworks excavated 300m to the southwest of the site
1921	Site indicated as a golf course. Brickworks no longer operational
1930s onwards	Residential development of Bishops Stortford to the west.
1960	Industrial building with sidings built 400m to the west
1982	Railway dismantled, M11 built
2014	The site remains an unused and unkept part of the golf course

### 3.2.3 Issues associated with previous land uses

Whilst the site itself has remained largely undeveloped, excepting its use as a golf course, a railway line was present adjacent the sites southern boundary, that could have acted as a source of contamination. Furthermore the brickworks formerly located 300m from the site may have been backfilled with wastes that could generate ground gases. The industrial works and depots are considered too far from the site to have had an adverse affect upon it.

### 3.2.4 Potential Contamination Sources

The potential contaminants and associated risks have been summarised in Table 4, using the historical data.

**Table 4; Historical study findings and potential contaminants associated with the sites past use.**

Off-Site Use	Receptor	Contaminant	Description	Risk
Former Railway Former Brickworks	Air/Land	Ground Gas	The former off-site brickworks, if backfilled, could contain wastes that degrade releasing toxic/explosive gasses. However the potential for on-site migration is limited by the envisaged low permeability soils	Low/Moderate
	Land	Metals and polyaromatic hydrocarbons associated with possible ash, clinker and coal	Likely to be located within former railway embankment and adjacent areas only	Low/Moderate
	Water	Metals and polyaromatic hydrocarbons associated with possible ash, clinker and coal	Due to the localised nature of the source, (see above) the low environmental mobility of these contaminant and the envisaged presence of low permeability soils at the site, contaminant migration towards controlled waters is unlikely	Unlikely

A review of the full set of historical maps (see Appendix 2) has confirmed the description of the site history given in Section 3.2.

### 3.3 Summary of the Desktop Study Key Findings

Key factual information obtained in the desktop study is summarised in Table 5;

**Table 5; Summary of Desk Study Information**

Aspect	Key Findings
Current Site Activities	Site part of Bishops Stortford Golf Course, although part of this area is now unkept.
Surrounding Land Uses	Site located on the edge of a residential area. A disused railway line was present to the south.
Visual Observations	Site formed partly by unkept ground and partly by the driving range. Some evidence of bonfires in the area.
Site History	The site has been used as a golf course since the 1920s. The railway embankment, forming the southern boundary of the site, was built in the 1880s and dismantled by the 1980s
Potential Sources of Contamination	<p><b>On Site</b></p> <p>Metal and polyaromatic hydrocarbons from ash, clinker and coal associated with the railway embankment. Unlikely to extend far onto site</p> <p><b>Off-Site</b></p> <p>Potential ground gas generation from possibly infilled brickworks</p>
Previous Investigations	None provided
Environmental Setting	Geological maps show the site is underlain by Lowestoft over the London Clay Formations. Both of these deposits are Unproductive Strata, but the Thanet Sand Formation and Lambeth Group located to the southwest are designated as a Secondary A Aquifer.
	The site is not located within a groundwater source protection zone.

## **4. RISK ASSESSMENT**

### **4.1 General**

In accordance with Environment Agency, CLR11 (2004) and R&D Publication 66:2008, Guidance for the Safe Development of Housing on Land Affected by Contamination, Stansted Environmental Services Ltd (SES) has developed an initial Conceptual Site Model to identify potential contamination sources, migration pathways, and receptors within the study area.

### **4.2 Potential Contamination Sources**

#### **On site potential sources**

Potential on-site sources of contaminants include;

- Metals and PAH compounds associated with the former railway embankment

#### **Off site potential sources**

- Ground gas from the possibly backfilled brickworks

### **4.3 Potential Receptors**

SES has identified the following possible receptors;

- Future site users and construction workers.
- Surface water.
- Buildings and services

### **4.4 Pathways**

The potential pathways for contaminants have been identified as;

- Direct ingestion, such as inhalation of dust and swallowing water.
- Indirect ingestion – absorption through skin.
- Plant uptake
- Surface Run-off.

### **4.5 Potential Pollution Linkages and Initial Risk Assessment**

The Conceptual Model for the site identifying the active pollution linkages is presented in the table overleaf. The initial risk categorisation has been based upon CIRIA 2001.

**Table 6; Initial Conceptual Site Model and Risk Assessment**

Potential Source	Potential Contaminant	Potential Migration Pathway	Potential Receptor	Likelihood of Occurrence	Potential Magnitude	Overall Risk Classification	Discussion
Former Railway	Metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Se, Zn), PAH	Contact with or ingestion of contaminated soils. Inhalation of dust.	Future Site Residents or Construction workers	Low	Medium	Low/Moderate	Limited investigation required
	PAH	Leaching and run-off and Possible leaks from effluent tanks	Surface waters and nearby aquifer	unlikely	Mild	Very Low	Low contaminant mobility and low permeability soils make this pollution linkage unlikely
	Metals (B, Cu, Ni, Zn)	Uptake by plants	Future planting	Low	Minor	Very Low	Limited investigation required
Potentially infilled brickworks	Ground Gas	Migration through shallow soils	Future Site Users and Buildings	Unlikely	Low	Very Low	Due to the distance from site and the envisaged presence of low permeability soils, on-site ground gas migration is considered unlikely

#### **4.6 Discussion of the Initial Conceptual Model**

The initial Conceptual Model indicates that there are potentially active pollution linkages associated with the site, although the most significant is a low risk to future site residents.

As such, a scope for the further investigation has been prepared and included in this report for agreement with the Local Planning Authority.

The risk to other potential receptors is considered to be very low, indeed so low they need not be considered further. However, should any unexpected conditions be revealed during the further investigation works, this risk assessment should be re-assessed.

**5. SAMPLING STRATEGY**

Based upon the findings of the Tier 1 Desktop Study and the Initial Conceptual Model, SES has prepared a sampling strategy to be carried out as part of limited Tier II Intrusive Investigation, targeting the potential areas of concern (close to the former railway embankment).

Sampling is proposed as detailed below and as the sampling location plan, which is contained within Appendix 6;

1. 6 shallow sampling locations (Area 1) and 12 shallow sampling locations (Area 2) have been identified with sampling proposed to be taken within the topsoil (~300mm). The samples will be analysed at a UKAS and MCERTS accredited laboratory for the standard CLEA suite and PAH compounds.
2. WAC testing on 2 samples should made ground soils be encountered.



## 6. CONCLUSIONS

A desktop study has been carried out at the site known as Bishops Stortford Golf Course, Dummow Road, Bishops Stortford, Hertfordshire, CM23 5HP.

This desktop study has concluded that there is a need for some very limited contamination sampling to be undertaken, in order to establish whether contamination levels exist on the site above UK threshold limit values, and if so, what remediation may be needed.

This conclusion is based upon several factors, which include the following;

- The presence of the former railway embankment and the potential for the spread of ash, clinker and coal within its make up and during its operational use

As such a sampling strategy has been developed for agreement with the Local Planning Authority.

The sampling strategy includes;

- The retrieval of shallow soil samples,
- Waste Acceptance Criteria (WAC) testing for any made ground soils that are to be removed from site.

Completion of the Tier 1 Desktop Study should address the requirements of the desk study part of any future contaminated land planning conditions, and should provide adequate information for a recommendation to be made to discharge that part of the Condition.

Based upon the findings thus far, Stanssted Environmental Services Ltd is of the opinion that contamination concerns should not pose a constraint on residential development for this site.

This page is intentionally blank

## **7. APPENDICES**

Appendix 1 – Landmark Envirocheck Report

Appendix 2 – Historical Maps

Appendix 3 – Geology Maps

Appendix 4 – Groundwater Vulnerability Maps

Appendix 5 – Site Sensitivity Maps

Appendix 6 – Proposed Sampling Location Plan

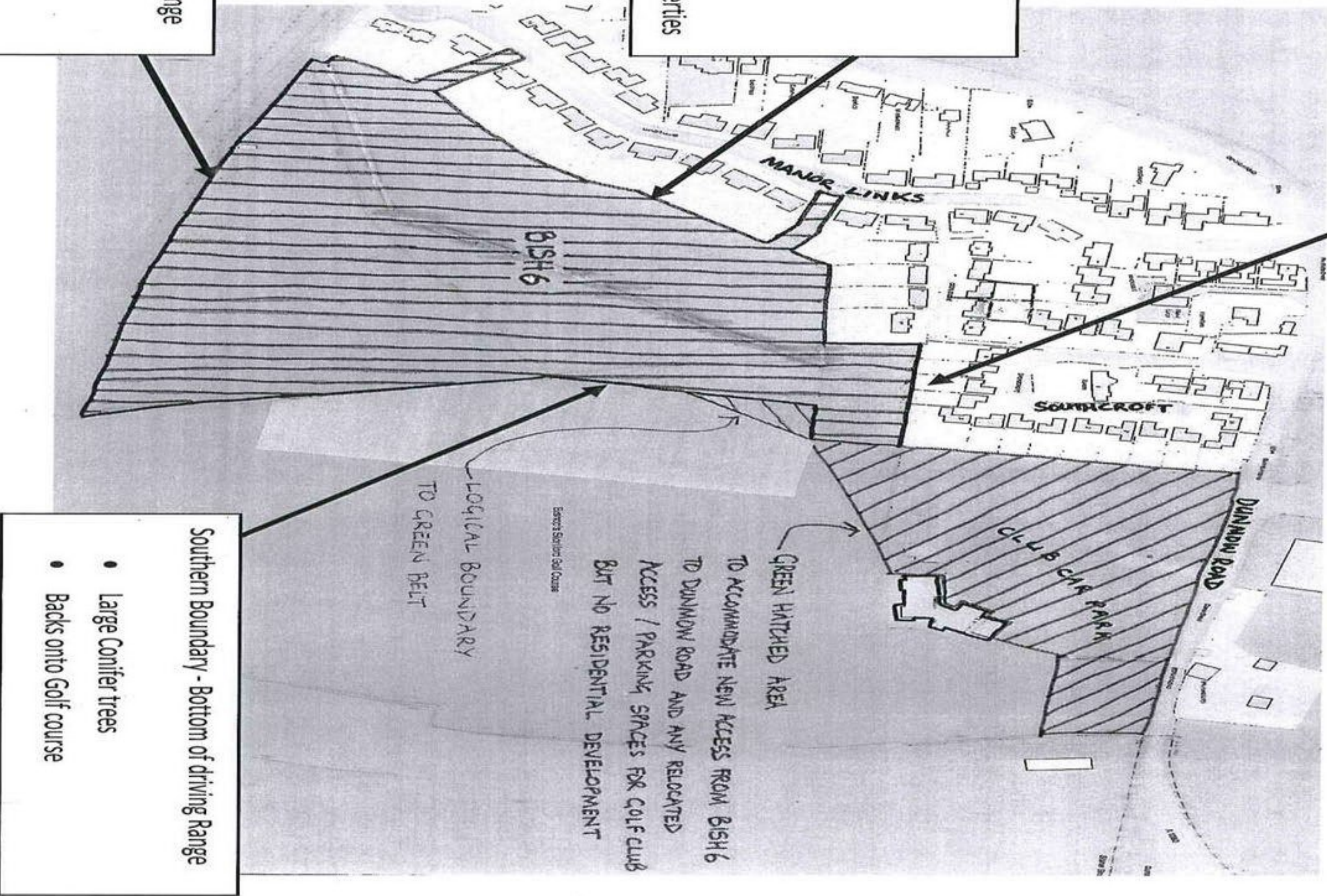
Appendix 7 – Site Walkover Checklist

**This page is intentionally blank**

- Northern Boundary - Top part of driving range (fee boxes)
- Flat grass area
  - Concrete hard standing 60m<sup>2</sup>
  - Overgrown wood land
  - Bushes
  - Backs onto back gardens of private properties

- Western Boundary - Overgrown Area
- Overgrown vegetation
  - Concrete hard standing 10m<sup>2</sup>
  - Rabbits, birds
  - Bushes
  - Backs onto back gardens of private properties

- Southern Boundary - Bottom of driving Range
- Flat grassland
  - Overgrown woodland
  - Backs onto Golf Course



- Southern Boundary - Bottom of driving Range
- Large Conifer trees
  - Backs onto Golf course