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INTRODUCTION

- 10.1 In order to consider the ground conditions at the site, a Preliminary Land Quality Risk Assessment (PLQRA) has been undertaken at the New England RRC application site.
- 10.2 The report provides a preliminary assessment of ground conditions with respect to contamination and the impact such contamination could have on the proposed development and the wider environment.
- 10.3 The information obtained from the assessment has been used to develop a preliminary Conceptual Model of potential risks to human and environmental receptors (targets). This Conceptual Model examines the potential Source-Pathway-Target Linkages in relation to identified or potential contamination issues at the site.
- 10.4 The work presented reports on the following:
- Site walkover survey – to identify visual evidence of past/current contaminative activities;
 - A review of historical records – predominantly historical Ordnance Survey (OS) maps;
 - Review of the site's underlying geology, hydrogeology and hydrology;
 - Purchase and review of an environmental database pertaining to on and off site sources of ground contamination and potentially sensitive receptors;
 - Construction of a Conceptual Model – linking any identified sources of contamination with likely current/ future receptors.
- 10.5 SLR has collected and reviewed various reports and maps in an attempt to characterise the Site and its surroundings. These sources include:
- Historical OS mapping, (Appendix 10 - 1);
 - An eMapsite® GroundSure EnviroInsight, report on the site conditions (including information obtained from local authorities and the Environment Agency) (Appendix 10 - 2);
 - eMapsite GroundSure GeoInsight report detailing the underlying ground conditions (Appendix 10 - 3);
 - British Geological Survey (BGS) (Sheet 349 - Ivybridge Scale 1:50,000 Drift Edition); and
 - An Engineering Geological Assessment Report undertaken for Viridor by Peter Brett Associates in February 2008; and

- a walkover which included an inspection comprising an audit of on-site and adjoining land uses and review of the site layout..
- 10.6 The information from the above sources is reviewed within the following sections of this report.

SITE SETTING & LAND USE

Current and Recent Site Use

- 10.7 A site walkover survey was undertaken by SLR in May 2009. The site is irregular in shape and is associated with the extraction of dolerite and processing of aggregate and road stone. As such the site is dominated by a quarry void, the sump of which is filled with water to an elevation of about 49m above ordnance datum (AOD).
- 10.8 The site is currently accessed from the north-eastern side of New England Hill. Immediately within the site entrance are a number of disused buildings and infrastructure relating to the previous quarry operations; these include a weighbridge, site office and the partially dismantled mineral processing and loading infrastructure.
- 10.9 The quarry itself is cut in a near vertical plane with a series of benches, or terraces, cut at various heights and of various sizes. These terraces have become part-colonised with grasses.
- 10.10 Deciduous woodland bounds the quarry void to the north, south and east. The area to the west of the void comprises grassland fields and hedgerow.
- 10.11 Further to quarrying activities the site has most recently been used by Devon and Cornwall Police for training purposes and the quarry sump has been used for scuba diving.

Potentially Contaminative Activities

- 10.12 There are no current activities likely to cause significant ground or groundwater contamination. Several site buildings remain at the site and may have potential to include asbestos containing materials (ACMs) and this area itself was formerly associated with plant storage – therefore there is some potential for localised hydrocarbon contamination. It is plausible, for instance, that the re-fuelling of vehicles took place from fixed or mobile fuel tanks. Generally however there was no evidence of ground contamination observed during the site walkover.

Historic Land Use

- 10.13 Table 1 presents information obtained from historical maps purchased by SLR (presented in Appendix 10 - 1).

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Table 10-1
Historical Land Use

Date	Land Use	Potential Contaminants
1886	<p>The site is predominantly occupied by woodland (including Southwood Wood and New England Plantation) and open fields. Part of the site within Southwood Wood is annotated as an Old Quarry, as is an area either side of the River Yealm in the central west area of the site.</p> <p>A small quarry (Southwood Quarry) is located just off the south-western corner of the site.</p> <p>The only building on site is a barn located in the south-west corner of the site. A spring is located close to the west boundary of the site in this area.</p> <p>Surrounding land use is predominantly woodland and open fields. Lee Mill (and associated Paper Mills) is located approximately 1km to the north of the main body of the site in the area the proposed new access will intersect with the A38.</p>	None likely other than associated with any in-filling of old quarries, which is not clear from the maps.
1907	The site and surrounding area remains unchanged.	None
1954	<p>By 1954 excavation of New England Quarry had commenced near the centre of the main body of the site. Several small buildings had been constructed on the southern boundary of the site.</p> <p>Few other changes had occurred other than a Sewage Works 1km north-west of the main site.</p>	Limited potential for contamination. No evidence of in-filling of void.
1965	Incomplete map – no significant changes indicated.	None
1970	The site and surrounding area remains unchanged.	None
1960	<p>Quarrying activities at the site had increased in size in the centre of the site – creating roughly the quarry void that is present today. The quarry extends into Southwood Wood in the area of the Old Quarry and to the east and the River Yealm.</p> <p>Additional buildings are located in the south-east corner of the site. These correspond with the area recently associated with Plant storage and use and remain on site.</p>	Limited potential for contamination from ancillary activities e.g. re-fuelling, storage etc
1980	No significant changes shown other than a slight increase in quarry void.	None
1992	New England Quarry is more clearly annotated as a stone quarry on the 1992 map. The map also indicates a reduction in Southwood Woods to accommodate site activities. Void space is unlikely to have increased significantly.	None
2002	<p>Several significant changes had occurred at the site and within the surrounding area.</p> <p>The map indicates the presence of two landfill operations just north of the main body of the site. The</p>	Potential for contaminated materials within “fill” material – although any soils used are believed to have been inert

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Date	Land Use	Potential Contaminants
	<p>proposed access road effectively runs between the sites adjacent to the River Yealm.</p> <p>Quarrying activities at the site would appear to have ceased. The quarry void is now water-filled, although it is believed that at least some infilling with "inert" materials took place.</p> <p>A network of land drains are indicated in the west portion of the site, outside the quarried area.</p>	quarry wastes.
2008	No significant changes are indicated.	None

- 10.14 The review of historical Ordnance Survey maps indicates the site to have an early association with localized quarrying activities. By 1954 however the main part of the site had commenced excavation as a stone quarry, which increased in size until some time prior to 2002. Only limited ancillary activities (in the form of small buildings and hardstandings) have been located at the site historically and these remain to date.
- 10.15 The surrounding area has always been predominantly open fields and woodland, with residential and commercial development around a kilometre from the site. Quarrying activities have however been undertaken in the surrounding land. Notably two landfill sites are located directly to the east of the access road.
- 10.16 In terms of likely ground contamination, since the quarry void has never been backfilled there is little evidence that significant ground contamination would have occurred beyond the storage and use of any chemicals and hydrocarbons (likely to be very limited) and the nature of materials used in buildings (which could have included asbestos).
- 10.17 Notwithstanding the above Environment Agency records indicate that New England Quarry itself operated as a landfill between 1994 and 2002. This is discussed in more detail below however it does mean that there is potential for substantial Made Ground in certain areas of the site.

SITE CONDITION & ENVIRONS

Topography

- 10.18 The topography of the site is formed by the Yealm Valley and previous quarrying activities and as such varies substantially across the site.
- 10.19 The surface of the water located in the quarry sump is around 49m AOD and the terraces above rise to about 77m AOD. From here the topography dips sharply to the east and the River Yealm.
- 10.20 The area to the north of the quarry void lies at around 60m AOD, while to the west the land raises to 81m AOD. In contrast the former weighbridge area and existing site access lie at approximately 38m AOD.

Surface Features

- 10.21 The main surface features associated with the site are the quarry void – including water within the sump and terraced sides, the former plant and weighbridge areas and an area to the north of the quarry void comprising a large, un-vegetated area (formerly a stocking area). The remainder of the site is predominantly vegetated by grassland or woodland.

Ecology and Designations

- 10.22 The north eastern corner of the site and much of the woodland to the north, south and east has been designated as Mackarell Parks, Southwood Woods and Strashleigh Ham County Wildlife Site (CWS) for the presence of ancient semi-natural woodland.
- 10.23 The north western corner of the site has also been designated as New England Fields County Wildlife Site for the presence of marshy grassland habitats.
- 10.24 Much of the quarry void has also been designated as a Regionally Important Geological and Geomorphological Site (RIGS) due to the presence of Gabbro intrusion into middle Devonian slate. Several other non-statutory wildlife sites are present within 2km of the site boundary; these are predominately ancient woodland and neutral grassland sites.

Geology

- 10.25 The following sections are taken from the relevant section of the Environmental Statement, itself based on a 2008 Peter Brett Engineering Assessment and a site walkover survey undertaken in May 2009 by SLR.

- 10.26 Information pertaining to landfill and quarry activities has been obtained from Local Authority and Environment Agency Records (Appendix 10 - 2) and previous Planning Applications and Permissions.

Regional Geology

- 10.27 The British Geological Survey (BGS) (Sheet 349 – Ivybridge) indicates that the site is underlain by igneous Diabase or Dolerite, which is intruded into the surrounding Middle Devonian Slate. The igneous intrusion trends east to west with the slates outcropping on the northern and southern sides of the site. The Middle Devonian Slates regionally dip steeply to the south. Normal faulting in the area is generally north northeast to south southwest.
- 10.28 The Dartmoor Granite is located approximately 3km to the northeast of the site. The granite was emplaced following intrusion of the quarried Dolerite, although the metamorphic aureole associated with the granite does not extend into the Dolerite and Slates on site. However, the slates are locally altered around contact with the Dolerite intrusion.

Local Geology

- 10.29 The lenticular Dolerite intrusion extends east to west through the centre of the site with slate outcropping to the north and south. Where exposed within the quarry, exposed rock faces have weathered due to oxidation of iron minerals to produce a brown colouration. In its fresh state, the Dolerite is grey blue to dark green and in general it is recorded as slightly weathered on the lower northern quarry bench, moderately weathered on the south of the quarry and highly weathered in the west.
- 10.30 Although locally highly weathered, there is no evidence that the dolerite or surrounding Slates have been heavily mineralised, but where present only occurs along joint and shear faces.
- 10.31 The Engineering Geology Assessment of the site indicates that actinolite and anthophyllite, both naturally occurring asbestos minerals, are present along some of the local shear surfaces within the exposed Dolerite quarry faces. This is documented in a report undertaken by Peter Brett Associates in 2008.
- 10.32 The presence of actinolite was subsequently confirmed by sampling and testing of the Made Ground undertaken in June 2009 by SLR. The results of this analysis are included as Appendix 10-4.
- 10.33 If the Made Ground at the site is formed from aggregate processing spoil, it is likely to be contaminated (at least in part) with the naturally occurring actinolite and anthophyllite asbestos minerals.
- 10.34 Notwithstanding the above the presence of naturally occurring asbestos within the Dolerite is not an issue associated with the commercial history of the site and in this respect ground contamination has not occurred beyond

- the possible presence of asbestos within quarry waste on the surface of the site.
- 10.35 The presence of asbestos has been included within the Conceptual Model (CM) presented below, but the issue itself is considered one to be mitigated by design, engineering and ongoing health and safety management rather than by specific remedial measures.
- 10.36 The majority of the surface area to the north and west of the quarry void was observed to be overlain by weakly or non-vegetated fine to coarse granular made ground assumed to be spoil from the quarry process.
- 10.37 Only small scale faulting was observed within the quarry faces, indicated by slickensided joint faces and some small scale displacement. No major faults are recorded within the site or immediate surrounding area on the 1:50,000 geology map. The boundary between the Dolerite and the Slates was observed on the upper quarry benches on the south side of the quarry void, trending approximately east-west.
- 10.38 A band of Alluvium associated with the River Yealm runs along the eastern and northern site boundary, although does not appear to be present within the proposed development area.

Mining, Quarrying and Landfilling

- 10.39 The site is a former stone quarry and is in part proposed for development as a non-hazardous landfill.
- 10.40 Previous landfilling activities at the site have included the brief operation of the site as an inert landfill from 1994 to 2002 (when the licence was surrendered). This operation actually involved the importation of quarry and processed waste from Moorcroft Quarry and no other material is believed to have been deposited since. It is believed the material was used to form an amenity bund.
- 10.41 Beyond the above there are two historic Planning Permissions relating to proposed Spoil Dumps in the mid 1950s. It is not clear whether these were ever commenced at the site however.
- 10.42 Current local landfilling operations are located to the north and north-west of the main area of the study site at Challonsleigh Farm and Strashleigh Hams. There are various active and inactive cells associated with these landfills (all off-site) and the sites have accepted inert and non-hazardous wastes only. The proposed site access road will be located between these landfills, extending north from New England Quarry to the A38 alongside the River Yealm.

Hydrogeology

- 10.43 Both the solid geology of the site and the alluvial deposit associated with the River Yealm on the east boundary of the site are Minor Aquifers.

- 10.44 The site is not located within a groundwater Source Protection Zone.
- 10.45 The main quarry void is approximately 300m across and up to 35 to 40 metres deep. The quarry is currently flooded with water levels recorded at 49.60m AOD on the topographic survey undertaken in May 2008. It is likely that flooding within the quarry is coincident with the local groundwater regime.

Groundwater Abstractions

- 10.46 The closest known groundwater abstractions to the site are located at Beech Farm and Strashleigh Farm. In both cases the abstractions are related to farming and domestic supply.
- 10.47 Beech Farm is located about 1.0km north of the main application area, but very close to (or possibly within) the proposed new access point to the site from the A38.
- 10.48 Strashleigh Farm and associated boreholes are located within around 200m of the proposed site access road, but again are at some distance from the main application site.
- 10.49 There are not believed to be any potable groundwater abstractions for public supply within 1.0km of the site.

Hydrology

- 10.50 The hydrology of the site is dictated by the River Yealm and the sump of the quarry void, which is water-filled.
- 10.51 The River Yealm dissects the site from north to south and effectively forms the east boundary of the main portion of the site. The proposed access roads will run north from the main site to the A38 and east of the River.
- 10.52 The River Yealm is a narrow, fast flowing river and is fed from several tributaries located predominantly to the east of the site.
- 10.53 There are four local discharge consents to surface waters. All are to the River Yealm or tributaries to the north of the main site. The closest is located to the south of the A38 adjacent to the proposed access road, but several hundred metres from the main site. The remaining consents are north of the A38. All are associated with sewage discharges in Lee Mill.
- 10.54 The site formerly abstracted water from the River Yealm for the processing of materials (Licence no. 15/47/001/S/024).

Existing Reports

- 10.55 No previous reports regarding contaminated land have been made available to SLR. In 2008 Peter Brett Associates undertook an Engineering Geological

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Assessment. This report was commissioned in relation to the proposed construction of a landfill at the site and provided an assessment of rock mass quality exposed in the existing quarry faces and considered the potential for the re-use of materials on site. Additionally the report confirmed the presence of naturally occurring asbestos within the Dolerite intrusion.

OUTLINE CONCEPTUAL MODEL

Land Quality Risk Assessment

- 10.56 The normal procedure for assessing land dictates that the above summary of potential Contaminants, Pathways and Receptors should be considered within the context of Potential Pollutant Linkages and that an evaluation of the risks associated with each linkage should drive decisions regarding the status of the land as contaminated, uncontaminated or requiring further investigation.
- 10.57 In order to build the outline conceptual model, this report section uses the information gathered in previous sections and aims to identify all the Contaminants, Pathways and Receptors with potential to be present on site. The elements of the conceptual model built in the tables that follow are used in subsequent sections to consider the Potential Pollutant Linkages, their significance and acceptability.
- 10.58 The proposed development of an EfW plant and ancillary facilities will result in a commercial setting. In this respect long-term risks to on-site human receptors will be comparatively lower than, say, a residential project. The presence of any contaminated land is however likely to be encountered during construction of the development and in relation to the re-profiling of the landfill. The site will have a predominance of hardstandings and as such exposure to contaminated soils would generally be minimal post-development. The site will also feature landscaped areas in which some exposure to soils could occur and part of the site and surrounding area are known to have been in-filled with waste materials.

Contaminant(s)

- 10.59 The statutory guidance for Part IIA, DETR Circular 02/2000, defines a Contaminant as:
- 10.60 *“a substance which is in, on or under the land and which has the potential to cause harm or to cause pollution of controlled waters”.*
- 10.61 Evidence of likely ground contamination is relatively limited at this stage. The key issues identified in the sections above are as follows:
- Naturally occurring asbestos within the in situ Dolerite;
 - Presence of Made Ground in some areas of the site – imported waste materials used to form bunds – technically an inert landfill;
 - Potentially for localised contamination around former plant areas, the weighbridge etc;

- Off site sources of contamination – notably the landfills to the north and north-east of the main study area and that will be either side of the new access road. Table 2 summarises contaminants with the potential to be present at the study site in relation to the above.

Table 1
Potential Contaminant(s)

Contaminant Phase	Elements and Compounds	Notes
Solid phase – particles of contaminant, including asbestos.	Metals – potentially associated with Made Ground (if present). Asbestos containing materials.	Some potential for the presence of contamination in imported Made Ground and areas of the site used for stocking and ancillary activities. Asbestos containing materials may be (or have been) present in site buildings, although there is no specific evidence to suggest ground contamination has occurred. Naturally occurring asbestos has been identified in the quarry face and may also be present in quarry waste on the surface of parts of the site.
Sorbed phase – contaminants sorbed onto soil particles	Fuels or other petroleum hydrocarbons. Polycyclic aromatic hydrocarbons (PAHs) associated lubricants, solvents etc. and hydrocarbon storage	Limited potential for organic pollution to be present. There is some potential for localised hydrocarbon contamination in plant areas – particularly where re-fuelling and maintenance would have taken place.
Free phase – contaminants present in soil and /or porosity as non-aqueous phase liquid (NAPL)	Fuels – petroleum hydrocarbons possibly including solvents	As above, very limited potential for free phase contamination to be present.
Gas and vapour phase – contaminants present as gas or vapour in the soil	Petroleum Vapours Land or landfill gas.	Significant issues regarding vapours (e.g. hydrocarbon) have not been identified and are unlikely. There is potential for the generation of land gases (methane, carbon dioxide) both on and off site. On site issues relate to the presence of Made Ground generally and to imported waste soils. Off site two landfills are located within close proximity to the site.
Dissolved phase – contaminants dissolved in	Hydrocarbons – petroleum hydrocarbons possibly	Conceptually plausible but unlikely to be significant given the controls that

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Contaminant Phase	Elements and Compounds	Notes
groundwater	including solvents.	are likely to be in place for the landfills north of the site. The site itself is unlikely to have contributed significantly to reduced groundwater quality to date.

Pathways

- 10.62 The statutory guidance for Part IIA, DETR Circular 02/2000, defines a Pathway as:
- 10.63 “one or more routes or means by, or through, which a receptor: (a) is being exposed to, or affected by, a contaminant; or (b) could be exposed or affected”.
- 10.64 Following an assessment of the environmental and geological setting of the site and considering the proposed land use, it is considered that a number of potential pathways for contaminant impact could potentially exist were a significant source of contamination and viable receptors present. Tables 3 and 4, below, examine the environmental and human exposure pathways that could be considered potentially active.

**Table 2
Potential Environmental Exposure Pathways**

Pathways		Potential Presence (✓/✗)	Notes
Ecological	Ingestion of soil & dust	✓	Plausible pathway although no major designations (e.g SSSIs, AONBs etc) have been identified. Certain areas of the site and surrounding area are protected marshy grassland and semi-natural woodland habitats.
	Ingestion of food	✓	
	Ingestion of water	✓	
	Dermal Exposure	✓	
	Inhalation of dust	✓	
	Inhalation of vapour	✓	
Property: Flora & Fauna	Root Uptake	✗	Plausible risk pathway in relation to the above, but generally these pathways are absent.
	Leaf Contact	✗	
	Ingestion of soil & dust	✗	
	Ingestion of food	✗	
	Ingestion of water	✗	
	Dermal	✗	

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Pathways		Potential Presence (✓/✗)	Notes
	Exposure		
	Inhalation of dust	✗	
	Inhalation of gas/vapour	✗	
Property: Buildings	Contact with materials	✓	Potentially active pathways if significant contamination present.
	Build-up of vapours	✓	
	Unstable materials	✓	
Controlled Water: Surface Waters	Surface runoff	✓	All plausible pathways given the sites location on a minor aquifer and the River Yealm which effectively bounds the site to the east.
	Movement of contaminants via drains etc	✓	
	Migration via groundwater	✓	
Controlled Water: Groundwater	Leaching from soil	✓	Pathway present, although of comparatively low sensitivity. Site located on a minor aquifer.
	Movement of contaminants via drains etc	✓	

Table 3
Potential Human Exposure Pathways

3

Exposure Pathway	Critical Medium	Potential Presence (✓/✗)	Notes
Ingestion of soil	Soil	✓	Ingestion and inhalation of soil and building dust plausible, both during construction of the EfW and long-term in relation to quarrying and landfill activities. As above with respect to dermal contact with soil. Post-development there will be much lower exposure – with the exception of the continuing landfill operations. Vegetables will not be grown at the site. Dust generation likely, but the developer is obliged to control this quite apart from possible contamination content. Very limited risk associated with hydrocarbon vapours. Potentially for land gases is more significant given proximity to filled ground. Numerous pathways potentially active, but this depends on the presence of both a significant source of contamination and
Ingestion of building dust	Indoor dust	✓	
Ingestion of contaminated vegetables	Vegetables	✗	
Ingestion of soil attached to vegetables	Soil	✗	
Dermal contact with soil	Soil	✓	

Exposure Pathway	Critical Medium	Potential Presence (✓/*)	Notes
			viable receptors as discussed elsewhere in this report.

PRELIMINARY RISK ASSESSMENT

Potential Pollutant Linkages, their Significance and Recommendations

- 10.65 The tables below consider the elements present within the conceptual model for this site. Those potential contaminants, pathways and receptors that are present are now integrated within the context of potential pollutant linkages. The linkages described below are considered to be plausible and more likely to exist than not.
- 10.66 This level of qualitative assessment seeks to examine the significance of the potential pollutant linkages and describes the linkages using the phrases below:
- **pollutant linkage is significant:** meaning that humans or the environment are or will be at an unacceptable risk and that remedial works are required;
 - **further data required to be obtained via detailed inspection:** meaning that additional information is needed; and
 - **pollutant linkage unlikely to be significant:** meaning that no further action is required.
- 10.67 The text also includes comments regarding any uncertainty and recommendations regarding further risk assessment. The recommendations also provide an outline scope for further visual inspection, sampling and intrusive investigations.
- 10.68 The assessment has identified that humans, buildings, ecosystems, groundwater and surface waters are the relevant credible receptors. Whether an unacceptable risk is actually present will depend on a source of contamination – which at this stage is in most cases not proven. At the qualitative stage however the purpose of the assessment is only to identify the likelihood of a pollution linkage – and not to prove it.

Harm to Human Health

On-site human receptors

- 10.69 There is generally no specific evidence of significant ground contamination that is likely to impact humans on the site. There is some potential for localised organic and inorganic contamination in certain areas of the site – but this is highly unlikely to be extensive and will be more robustly investigated at the detailed design stage.

- 10.70 Potential risks associated with any contamination present include direct contact and ingestion of soils during construction, limited exposure to soils post development, the inhalation of contaminated dusts (indoors and outdoors) and risks associated with the inhalation of vapours.
- 10.71 In all of the above cases risks are likely to be low and easily mitigated, however for the purposes of this assessment the presence of Made Ground, waste materials and limited areas of the site in which ground contamination could have occurred are such that we would conclude further data is required via detailed inspection. This is likely to comprise a confirmatory and fairly generic level of site investigation in the first instance.
- 10.72 The presence of naturally occurring asbestos within the quarry is also an issue where further data is required via detailed inspection. To date it has been confirmed that naturally occurring asbestos is present within the Dolerite intrusion. This in itself may not pose an unacceptable risk to human receptors however – actual risks will depend on the extent to which the material is prone to fugitive fibre release, aggressive activities in the area where the material is located and the location of exposure points on site. The key issues are likely to be associated with the need to disturb/remove natural materials from the quarry face and that contain asbestos and the extent to which quarry waste on the surface of the site also contains this material.
- 10.73 In practice we would consider the issues surrounding naturally occurring asbestos to be a management and health and safety consideration rather than a pure contaminated land project. Either way we would propose that a detailed assessment is undertaken at the Detailed Design stage and suitable mitigation measures put in place going forward. With respect to the later there are many likely suitable forms of mitigation that range from isolating the issue, to providing asbestos air monitoring PPE and decontamination facilities, to the careful management of soils. At this stage it is too early to state what measures (if any) are likely to be required, however the key point is that these risk mitigation measures do exist and are relatively simple to implement.
- 10.74 A theoretically active pollution linkage relates to human exposure to potentially contaminated groundwater. It is considered unlikely that a significant impact has occurred on groundwater at the site (see below section), but it is possible that off-site groundwater contamination has occurred as a result of landfilling to the north. Given the relatively young age of these sites we would suggest that significant groundwater contamination is unlikely due to strict controls implemented by Environmental Permitting etc – but if groundwater contamination is present the water within the on-site quarry void could have become impacted.
- 10.75 On balance we would consider that the above pollution linkage is pollutant linkage unlikely to be significant and will in any case be a very short term issue assuming development proceeds. Additionally the site has most recently been used for scuba diving and no issues have been reported.

Off-site Human Receptors

- 10.76 With respect to historic/recent site activities and risks to off-site human receptors the pollutant linkages are unlikely to be significant due to distance, limited likely extent of any contamination and the lack of current site activities.
- 10.77 Going forward as the development progresses we would generally consider pollution risks to be within acceptable limits. Dust generation and migration over the boundary of the site is plausible, however this is another management issue – the contractor being obliged to control dust levels regardless of possible contamination content.
- 10.78 With respect to the disturbance of asbestos within the quarry, and although generally speaking off-site human receptors are at some considerable distance further data is required via detailed inspection. This should be undertaken at the Detailed Design stage as for site-based issues.

Damage to Buildings / Structures

- 10.79 Risks to buildings and structures are generally considered low with respect to ground conditions. Theoretical risks may derive from 1) solid contaminants or free phase hydrocarbon contaminants to cause deterioration of the existing structure's foundations or underground infrastructure; 2) the potential for ground gas to become concentrated, to explosive levels, beneath the existing structure / buildings; and 3) the potential for locally weak ground to provide inadequate support to the proposed structures.
- 10.80 Of the above a separate geological assessment has been completed and is beyond the scope of this report and soil based contamination is unlikely to be elevated such that significant risks are actually present, therefore these pollutant linkages are unlikely to be significant.
- 10.81 With respect to ground gases further data is required via detailed inspection due to the presence of Made Ground on site and landfills to the north. In reality gas levels are likely to be fairly low, but currently this cannot be established as fact. We would propose that the site investigation (geotechnical and environmental) that will be undertaken at the Detailed Design stage incorporates the provision of gas monitoring wells and subsequent monitoring.

Risks to Ecosystems

- 10.82 There are several non-statutory wildlife sites within 2km of the site boundary (ancient woodland and neutral grassland sites) and the north-eastern corner of the site and much of the woodland to the north, south and east has been designated as Mackarell Parks, Southwood Woods and Strashleigh Ham County Wildlife Site (CWS) for the presence of ancient semi-natural woodland.

- 10.83 The north western corner of the site has also been designated for the presence of marshy grassland habitats.
- 10.84 In its current form the site is unlikely to impact any of the above significantly. As the development progresses it is intended that the site will compliment rather than cause detriment to these features.
- 10.85 With respect to local ecosystems pollutant linkages are unlikely to be significant.

Pollution of Controlled Waters

- 10.86 Given the lack of evidence of significant contamination and the status of the underlying aquifer risks to controlled waters are generally considered unlikely to be significant. Some filling has occurred at the site, but most operations undertaken were related to the removal of material, which required relatively little ancillary activities. There may be pockets of isolated contamination, but these are unlikely to significantly impact groundwater of the River Yealm.
- 10.87 In the context of the progression of the development however more detailed hydrogeological studies will be undertaken. These will concentrate on risk mitigation of the impact of the proposed on the environment rather than necessarily considering historical impact – but baseline conditions will be assessed.

SUMMARY

- 10.88 Having considered the above criteria including the uncertainties and gaps in the conceptual model, it is apparent that the Preliminary Risk Assessment using desk study information alone, in most cases, provides a reasonable level of information for the proposed use, and on the absence of evidence of any plausible pollutant linkages no potentially unacceptable risks are considered to be present.
- 10.89 Notwithstanding the above there are several potentially complete pollution linkages that are considered to require further assessment as follows:
- The possible presence of limited ground contamination in certain areas of the site – considered unlikely to indicate widespread contamination and could be undertaken in isolation or during subsequent geotechnical assessment;
 - Ground gas/landfill gas generation and migration to the built environment – could be undertaken in the context of site investigation as above or with a view to accommodating long-term monitoring at the site; and
 - Naturally occurring asbestos – further assessment required in terms of extent, significance, soils management and mitigation likely to be required.

- 10.90 In all of the above cases it is considered that qualitative assessment alone has demonstrated that the site is suitable for development as an EfW and that any further investigation and mitigation planning can be undertaken at the Detailed Design stage as for other disciplines.