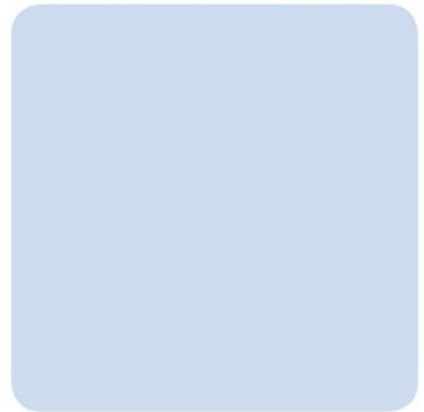




Desk Study and Preliminary Risk Assessment
Land at Model Farm, Vale of Glamorgan
RPS Cardiff



Date: 24 May 2018

Our Ref: JER1539

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Quality Management

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Amendment Record

Revision No.	Date	Reason for Change	Authors Initials
1	25/05/2018	Review	LW

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1 Introduction

1.1 Background

- 1.1.1 RPS Planning and Development (RPS) was commissioned by Legal & General to undertake a Phase 1 Desk Top Study (DTS) and Preliminary Risk Assessment (PRA) report in support of the redevelopment of a site at; Model Farm, Rhose, Vale of Glamorgan, CF62 3BD, at National Grid Reference (NGR) 307860, 167510.
- 1.1.2 It is understood that the application site is to be redeveloped as an 'Enterprise Zone' with employment allocation and commercial/industrial space. The extent of the proposed site development which covers an area of approximately 41 hectares is presented in *Appendix 1*. This area is herein referred to as the 'Assessment Site'. A site location plan is provided in Drawing 1.
- 1.1.3 The purpose of undertaking this assessment is to establish the potential for the presence of ground contamination at the Assessment Site as a result of former and current land uses within the boundary and in the local vicinity. This assessment also considers ground stability to provide an indication of potential geotechnical considerations for the proposed development.
- 1.1.4 The assessment has been undertaken to a standard that is considered suitable to meet the initial requirements of planning as outlined within the National Planning Policy Framework (NPPF) (*Ref. 1*).

1.2 Proposed Development

- 1.2.1 It is understood that the site is to be developed as an 'Enterprise Zone' with employment allocation and commercial/industrial space. A concept masterplan is shown in Drawing JCD0064-010.

1.3 Objectives

- 1.3.1 The objectives of this assessment are to:
- Assess likely existing ground conditions, including geological, hydrogeological and hydrological conditions to establish baseline conditions and allow an assessment of environmental sensitivity;
 - Identify potential contamination sources, both from historical and current activities, that may have led to contamination of the Assessment Site; and
 - Develop a PRA including a Conceptual Site Model (CSM) to support an assessment of the likely risks associated with potential contamination at the Assessment Site.
- 1.3.2 The methodology followed to produce this DTS and PRA is detailed in *Appendix 2*.

1.4 Limitations of the Desktop Study

- 1.4.1 This assessment is limited to the information available at the time of production including an Envirocheck Report (*Ref. 2*) and published environmental / geological data (*Ref. 3*).
- 1.4.2 A copy of the Envirocheck Report and Historical Maps is presented within *Appendix 3*.
- 1.4.3 RPS has not been provided with any previous ground investigation reports for the Assessment Site.

2 Site Walkover

- 2.1.1 A site walkover survey was undertaken on 27th April 2018 by an RPS Consultant. The main findings of the site walkover survey are detailed below.
- 2.1.2 With the exception of the Model Farm compound in the north of the Assessment Site, the remainder was noted to be entirely undeveloped at the time of inspection and comprised either grassed open farm land (Grazing) with occasional areas of brambles, trees and shrubs, or fields farmed for crops (Arable).
- 2.1.3 The Assessment Site slopes gradually towards the woodland area in the southwest, with a significant fall in elevation closer to the woodland. No faults, ground scarring or other potential instability features were noted.
- 2.1.4 A culverted outlet of the Bullhouse Brook was identified in the wooded area to the south west of the Assessment Site. The culvert is assumed to run in an approximately west to east direction from the Cardiff International Airport. A large drainage cover was noted centrally within the Assessment Site and is assumed to be a junction in the culvert.
- 2.1.5 Vegetation die back and nettles was noted to the surface of the grass within the area of the former backfilled quarry. No evidence of Japanese Knotweed was identified. There was evidence of made ground and previous on-site structures in the area of the former quarry and landfill identified during the site walkover. Additionally an area of raised land, potentially comprising made ground was noted between the pond and farm buildings of Model Farm. An animal carcass (possibly sheep) was identified adjacent to the Bullhouse Brook culverted outlet to the south west of the Assessment site.
- 2.1.6 Poor waste management was noted in and around the buildings of Model Farm. This included a number of spillages and leakages from spent fuel/oil drums, stored in a covered area and partially on hardstanding. These were observed to have spilt into the ground and immediately adjacent surface water drainage. A large double-skinned fuel oil tank was noted to be positioned directly adjacent to site drainage. This presents a potential violation of bulk fuel storage regulations.
- 2.1.7 A single sheet of cement-bound asbestos roof sheeting (likely chrysotile) was identified in the Model Farm grounds.
- 2.1.8 A large number of airport fuelling tanks were identified immediately beyond Porthkerry Road to the west of the site boundary.
- 2.1.9 Photographs of the Assessment Site taken during the recent site walkover are provided in *Appendix 4*.

3 Land Use

- 3.1.1 This section sets out details of the current and historical land use of the Assessment Site and the surrounding area (*Table 3.1*). The data presented does not represent full details of all land uses, but those that are considered to have the potential to have led to contamination of the Assessment Site. For full details of the land use, the Envirocheck Report included within *Appendix 3* should be consulted.

Table 3.1 Land Use

Section	Description/Information		Comments / Potential Contamination Sources
Site Size	The Assessment Site is approximately 41 hectares in size.		N/A
Current Site Description / Layout*	The Assessment Site comprises of several adjoining undeveloped land parcels, situated to the east of Cardiff Airport. The parcels of land are primarily used for agricultural purposes, with areas of woodland and streams. Model Farm is located centrally along the northern boundary and comprises a residential property along with a number of agricultural and cattle outbuildings. A Site Location Plan is presented within Appendix 1.		Potential contamination sources exist at the Assessment Site resulting from poor waste management, including spillages and leakages from oil drums and isolated asbestos sheeting at the existing Model Farm complex, possible herbicides and pesticides used in agricultural fields and the backfilling of both the historic quarry and landfill with unknown materials.
Current Neighbouring Land Uses*	The site is bound to the north by Port Road, with open farmland and the Airport Hotel immediately beyond. Porthkerry Road forms the western site boundary with Cardiff International Airport immediately beyond. The area to the south and west is comprised of open farmland and woodland.		Cardiff International Airport is located immediately beyond Porthkerry Road to the west. Any spillages or leaks from fuelling tanks may potentially present a risk to the Assessment Site
Site History** <i>(Labelled features from the maps are given here in italics)</i>	Date On-site Land Uses		
	From	To	

Section	Description/Information			Comments / Potential Contamination Sources
	1871	1900	The Assessment Site comprises a number of undeveloped parcels of land. Woodland and 'Bullhouse Brook' are present in the south-western area of the site. The brook crosses this part of the site in a west-east orientation.	Potential contamination at the Assessment Site from as a result of poor waste management, including spillages and leakages from oil drums and isolated asbestos sheeting at the existing Model Farm complex, possible herbicides and pesticides used in agricultural fields and the backfilling of both the historic quarry and landfill with unknown materials. Additionally, a number of buildings of unspecified use (identified from historical mapping) were located on-site. An assumption has been made that they are related to agricultural buildings, given the rural site setting. Although, potential contamination may exist in the form of asbestos, fuel and oil leakages, herbicide and pesticide use, and TPH.
	1900	1921	The Vale of Glamorgan Railway Loop Line crosses the entire Assessment Site in a meandering east-west orientation. A quarry is present along the western site boundary and an unknown building (possibly residential) is located centrally.	
	1921	1936	The railway line and unknown building are no longer present. The quarry is no longer in use and referred to as 'old quarry'	
	1936	1938	Buildings associated with Model Farm are located centrally along the sites northern boundary.	
	1938	1975	Numerous unnamed buildings are located centrally and towards the west of the Assessment Site. A water tower is shown centrally along the southern site boundary, immediately north of the woodland area.	
	1975	Present	With the exception of the Model Farm associated buildings, all other structures have been removed from the Assessment Site. The quarry is shown as being infilled and the brook is shown as being culverted over a large portion of the south-western area of the site.	
	Date		Surrounding Land Uses (250m radius unless otherwise stated)	
	From	To		

Section	Description/Information			Comments / Potential Contamination Sources
	1879	1900	The surrounding land parcels consist of undeveloped fields which appear to be separated by hedgerows and lines of trees/shrubs. Woodland is present along the southern site boundary with the 'Bullhouse Brook' crossing the south western area of the site in an east to west orientation. An 'Old Limekiln' quarry is present along the southern edge of the brook in this area.	Cardiff International Airport is located immediately beyond Porthkerry Road to the west. Any spillages or leaks from fuelling tanks may potentially present a risk to the Assessment Site.
	1900	1919	The Vale of Glamorgan Railway 'Loop Line' meanders across the site from east to west. The old Limekilns is now referred to as a quarry. Further old quarries are present adjacent to the sites north western boundary. A small unspecified building (likely to be a farm building) is present centrally on the site, to the north of the woodland.	
	1919	1935	The railway is no longer shown as present. The quarry in the south western area of the site is now referred to as an old quarry.	
	1935	1975	The old quarry in the south western area of the site appears to have been extended north of the Bullhouse Brook. The brook in this area appears to have been partially culverted. A number of buildings are present along the assessment sites western site boundary. Model Farm is shown as being present on the sites northern boundary including a number of other unidentified buildings further west along the northern boundary and centrally within the site. The previously unidentified building to the north of the woodland area is now identified as a water tower.	
	1975	1993	The quarry in the south western area of the site is no longer shown as present. A number of tanks and an electricity sub-station is shown immediately beyond 'Porthkerry Road' to the west, with 'Glamorgan (Rhoose) Airport', later identified as 'Cardiff Wales Airport' shown further beyond. Additional development has occurred to Model Farm including a large pond located to the immediate west of the farm. 'The Airport Hotel' is located	

Section	Description/Information			Comments / Potential Contamination Sources
			immediately beyond Port Road to the north of Model Farm. A pond is also shown, located centrally within the Assessment Site and to the south of Model Farm.	
	1993	2000	Additional development has occurred to the road structure surrounding the site including the construction of a number of roundabouts. No further development appears to have occurred on site.	
	Distance & Direction	Details		
Landfills (500 m)***	Onsite	The nearest recorded historical landfill is located on site at Model Farm. The License holder was identified as 'Mr G.B.Jenkins'. The facility operated between 1991 and 1995 and is identified as having handled inert, commercial and household waste during this time. An area of unspecified filled ground (pit, quarry etc) has been identified on site within the Envirocheck Report. Historical mapping indicates the quarry identified within the south western area of the site, to have been infilled circa. 1975. It is unknown what fill materials have been used. Additionally, a further five infilled pits, quarries or ponds have been identified within 500 m of the Assessment Site.		Landfilled waste and artificial ground may represent a source of ground gas, ground contamination and leachate which may pose a risk to the Assessment Site.
Waste Treatment, Transfer and Disposal Sites (500 m)***	Off site	None recorded.		None recorded.
Potentially Contaminative land Uses*** (250 m)	Onsite	Poor management resulting in the escape fuel / oils to ground / drainage infrastructure. Potential use of herbicides and pesticides. Potential for any leakages or spillages to enter watercourses through damaged		Nettles and dead vegetation identified in area of former backfilled quarry, may be indicative of hazardous ground gas. None recorded.

Section	Description/Information		Comments / Potential Contamination Sources
		culvert beneath the site. Unknown backfilled materials in areas of former quarry and landfill.	
	Off Site	Airport fuelling tanks are located immediately beyond Porthkerry Road to the west.	These activities are likely to be well maintained and unlikely to pose a risk to the Assessment Site. There were no sources of potential contamination that could have arisen from the tanks identified at the Assessment Site.
Petrol and Fuel Sites*** (250 m)	On Site	Airport fuelling tanks are located immediately beyond Porthkerry Road to the west.	These activities are likely to be well maintained and unlikely to pose a risk to the Assessment Site.
	Off Site	An airport fuel station is located immediately beyond Porthkerry Road to the west of the Assessment Site.	No contamination identified.
Authorisations / Licences (250m)***	On Site	None recorded	None recorded.
	Off Site	None recorded	None recorded.
Recorded Pollution Incidents (250m)***	Off Site	None recorded within 250 m.	None recorded
	On Site	None recorded	None recorded
Pollution Prevention and Controls*** (500 m)	Off Site	None recorded	None recorded
	On Site	None recorded within 500 m	None recorded
Discharge Consents (500 m)***	Off Site	There are four recorded discharge consents within a 500 m radius of the Assessment Site. The closest being located approximately 17 m to the south west and is operated by Cardiff International Airport Limited for trade and other matter discharge purposes.	None recorded
	On Site	None recorded	None recorded

* based on site reconnaissance and review of Envirocheck Report (Ref. 2)

** based on review of Historical Maps (Ref. 4) obtained from Landmark

*** based on review of Envirocheck Report (Ref. 2)

4 Environmental Setting

- 4.1.1 This section sets out details of the environmental setting of the Assessment Site and the surrounding areas (*Table 4.1*).

Table 4.1 Environmental Sensitivity

Section	Description / Information				Issues / Comments
Geology & Hydrogeology**	Strata	Description	Aquifer Status	Anticipated Approx. thickness (m)	
	Topsoil	Unknown	Unknown	Unknown	Unknown thickness of topsoil/subsoil present at the Assessment Site.
	Superficial Deposits	Head Deposits	Secondary A	Unknown	The Envirocheck Report indicates there to be a feathering margin of Head Deposits (clay, silt, sand) to be present on the Assessment Sites south eastern boundary.
	Bedrock	Lavernock Shale Member	Secondary B	Unknown	The BGS online geological map indicates the Lavernock Shale Member to be present in the south of the Assessment Site.
		Porthkerry Member	Secondary A	In excess of 50 m	The BGS online geological map indicates interbedded limestone and mudstone of the Porthkerry Member to be present on site.
Groundwater Vulnerability	The Porthkerry Member is classed as a Secondary A and the Lavernock Shale Member Secondary B strata of high leaching potential. The superficial deposits, where present, are classified as a Secondary undifferentiated Aquifer.		The Envirocheck report indicates the soil to have a moderate to high leaching potential		Bedrock is classified by the EA as a Secondary A Aquifer and is therefore considered to be of moderate sensitivity. In the absence of overlying low permeability deposits (such as clay) the aquifer is considered vulnerable.

Section	Description / Information		Issues / Comments
	<i>Distance & Direction</i>	<i>Details</i>	
SPZs* (500m)	On site	None identified	None recorded
	Off site	None identified within 500 m of the Assessment Site.	None recorded
Surface Water (1km)*	On site	An inland river, associate with the Bullhouse Brook of the Thaw Cadoxton Catchment runs across the Assessment Site. This was identified on the site walkover as being culverted across the site area with an outlet into the Bullhouse Brook, located in the wooded area to the south west of the site. Additionally, a dipping pond is located immediately to the west of Model Farm.	The identified surface water features are considered a potential receptor for any contamination at the Assessment Site.
	Off site	The Bullhouse Brook continues off site to the immediate east and west.	The identified surface water feature is considered a potential receptor for any contamination at the Assessment Site, including spillages and leakages into site drainage from poor waste management of oil drums located in the Model Farm complex.
Licensed Water Abstractions (1km)*	On site	None recorded	None recorded
	Off site	None recorded	None recorded
Conservation Areas & Sensitive Land Use (1 km)*	On site	Ancient Woodland is identified as being present on site	The identified woodland is likely to be affected by redevelopment of the Assessment Site.
	Off Site	Ancient woodland is present in the immediate vicinity of the Assessment Site to the immediate north, south and north east. Additionally, a SSSI is located approximately 340 m to the north east.	These offsite sensitive areas are unlikely to be affected by redevelopment of the Assessment Site.
	<i>Is the site potentially affected?</i>	<i>Details</i>	
Radon*	Yes	The Assessment Site is within an intermediate probability radon area where 5% to 10% of homes are estimated to be at or above the Action Level. Basic radon protection measures are required in the construction of new dwellings.	N/A

Section	Description / Information		Issues / Comments
Coal Mining*	No	The Assessment Site is not in an area that is recorded as impacted by coal mining.	N/A
BGS Recorded Mineral Sites (1 km)*	On site	The Envirocheck Report has identified one BGS Recorded Mineral Site within the Assessment Site; attributed to opencast excavation of underlying Limestone of the Porthkerry Member, all opencast excavations have ceased.	The backfilled quarry is backfilled with an unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs) asbestos etc. and therefore a potential risk to human health exists. Additionally the backfill materials could potentially represent a source of gas.
	Off site	The Envirocheck Report has identified three BGS Recorded Mineral Sites within 1 km; attributed to opencast excavation of underlying Limestone of the Porthkerry Member, all of which are now closed.	The backfilled historic pits are likely to have been backfilled with an unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs) asbestos etc. and therefore a potential risk to human health exists. Additionally the backfill materials may represent a source of gas.
Historical Surface Ground Working Features	On site	None identified	None recorded
	Off site	As previously mentioned above, a number of pits and quarries were present in the area. However these have subsequently ceased operations.	The backfilled historic pits / quarries located in the vicinity of the Assessment Site are likely to have been backfilled with an unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs) asbestos etc. and therefore a potential risk to human health exists. Additionally the backfill materials may represent a source of gas.

Section	Description / Information		Issues / Comments
Foundered Strata / Landslide*	On site	The Envirocheck Report suggests that there is: • A low hazard potential for shrink-swell • Low to moderate hazard potential for landslides • A very low to moderate hazard potential for compressible ground • A very low hazard potential of collapsible ground • A very low to low hazard potential for running sand • A very low to low hazard potential for dissolution	There is a maximum risk rating of moderate, for landslides and compressible ground, at the Assessment Site. All other parameters are very low to low, with the majority classed as very low. An intrusive ground investigation is likely to be required due to the potential for increased construction costs or financial risks. Where vegetation is to be removed, the shrink-swell implications of this should be considered when designing foundations.

* based on review of Envirocheck Report (Ref. 2)

** based on review of geological and hydrogeological maps and the Envirocheck Report (Ref. 2)

5 Conceptual Site Model and Preliminary Risk Assessment

- 5.1.1 In line with CLR-11 (*Ref. 5*) guidance, a conceptual site model and preliminary risk assessment have been developed to qualitatively assess potential contaminant pollutant linkages identified at the Assessment Site. The risk level relevant to each linkage is stated in the context of potential risk to future Assessment Site users based on the proposed development.
- 5.1.2 The risk assessment is based on the proposed development of the Assessment Site for a residential land use (private gardens have been assumed to be included in the development).
- 5.1.3 The assessment is presented in *Table 5-1*.

Table 5.1 Site Conceptual Model

Contamination Source (Current and Historical land use)	Exposure Pathway	Receptor	Qualitative Assessment of Risk	Rationale
Onsite: Use as undeveloped agricultural land.	Migration of leachable contaminants vertically into groundwater	Groundwater	Low to Moderate	Poor waste management, surface water management and fuel storage activities at the Assessment Site and the previous backfilled quarry and landfill have the potential to have led to contamination at the Assessment Site. This would be somewhat mitigated if overlying clay rich soils are confirmed as present.
	Migration of leachable contaminants vertically into groundwater and subsequent horizontal migration into surface water, through ground or damaged culvert.	Surface Water 200 m south of boundary.	Moderate	The groundwater beneath the site is of moderate sensitivity (Secondary A aquifer). The previously backfilled quarry and landfill and to a lesser extent, current uses of the Assessment Site have the potential to have led to contamination of the Assessment Site (Farm with storage of fuels and oils).
	Dermal contact, inhalation / ingestion of dust and/or gas	Future Site Users	Low to Moderate	The previously backfilled quarry and landfill have the potential to cause harm to future site users, particularly ground workers during redevelopment. However this could be mitigated through the use of Personal Protective Equipment and contamination management procedures,

Contamination Source (Current and Historical land use)	Exposure Pathway	Receptor	Qualitative Assessment of Risk	Rationale
	Inhalation of gas and risk of explosion	Future Site Users and Property	Low to Moderate	The previous (backfilled quarry and landfill has the potential to pose a risk of ground gas to the property.
Off-Site: Cardiff International Airport, including refuelling tanks	Migration of leachable contaminants vertically into groundwater	Groundwater	Low	The superficial sand and gravel groundwater aquifer is of moderate sensitivity. There is the potential that contamination of the neighbouring airport refuelling tanks has contaminated the aquifer and surface water, however the tank area appears entirely surfaced with concrete hardstanding and the tanks are likely to be well maintained.
	Inhalation of vapours from contaminated groundwater migrating beneath the Assessment Site	Future Site Users	Very low	There is no information available to suggest groundwater underlying the site has been contaminated by an off-site source.
	Migration of ground gas onto site and subsequent inhalation and or explosion	Future Site Users	Very low	Five infilled pits, quarries, ponds have been identified within 500 m of the Assessment Site. However, the risk is considered to be limited due to the time elapsed since infilling and distance from site.

6 Conclusions

- 6.1.1 RPS was commissioned to provide a Desk Study (DTS) and Preliminary Risk Assessment (PRA) report in support of the planning application for the Land at Model Farm, Vale of Glamorgan. It is understood that the application site is to be redeveloped as an 'Enterprise Zone' with Employment Allocation and commercial/industrial space.
- 6.1.2 The purpose of undertaking this assessment was to assess the potential for the presence of ground contamination at the Assessment Site as a result of former and current land uses. The assessment provides a Conceptual Site Model (CSM) and Preliminary Risk Assessment (PRA) for ground contamination at the Assessment Site.
- 6.1.3 The DTS comprised an Assessment Site reconnaissance survey, a review of publically available records in order to confirm the potential for contamination and the environmental sensitivity of the Assessment Site and its surrounding areas.
- 6.1.4 Potential sources of contamination noted on-site and in the immediate off-site area, include backfilling of the historical quarry and landfill, poor housekeeping at Model Farm, poor site drainage practices at Model Farm, potential uses of agricultural pesticides on arable land and Cardiff international Airport to the west.
- 6.1.5 A preliminary CSM was developed to inform a PRA that assessed potential risks posed from the identified potential contamination sources to controlled waters, human health and property. The preliminary CSM has identified that the risk to controlled waters, human health and property should be considered low to moderate.
- 6.1.6 On the basis of the developed CSM and PRA, it is considered that further investigation in the form of intrusive ground investigation is required to characterise the site from a contamination perspective.

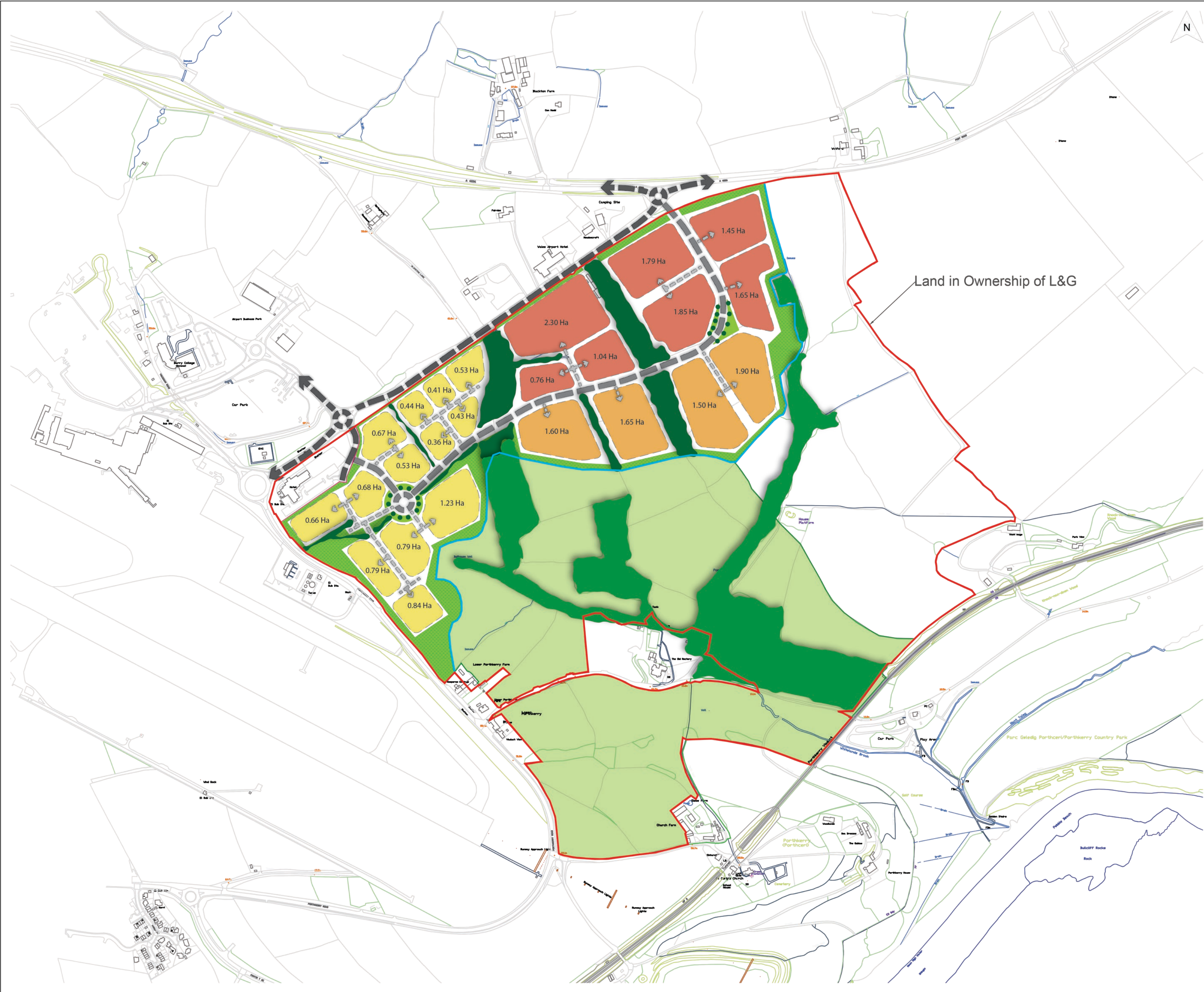
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5. Environment Agency. CLR-11 Model Procedures for the Management of Land Contamination, dated September 2004.

Appendices

APPENDIX 1

Site Location Plan



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Notes

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.

2. If received electronically it is the recipient's responsibility to print to correct scale. Only written dimensions should be used.

- Land In Ownership of L&G
109 Ha
- Allocated Land
40 Ha
- Allocated Porthkerry Park
Extension
42 Ha
- Small Business Units, Ancillary
Development & Leisure
Total: 8.36 Ha
- Office, Education & Training
Total: 6.65 Ha
- B1, B2 & B8 Uses
Total: 10.84 Ha
- Existing Road Network
- Proposed Spine Road
- Access Roads
- Existing Tree Belts
- Proposed Landscaping/
Existing hedgerows
- Landscape Buffer/Open Space

Rev	Description	Date	Initial	Checked



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Client L&G

Project Land at Rhoose

Title Concept Masterplan

Status DRAFT	Drawn By AW	PM/Checked by DP
Job Ref JCD0064	Scale @ A2 1:5000	Date Created MAY 2018

Drawing Number JCD0064-010	Rev -
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