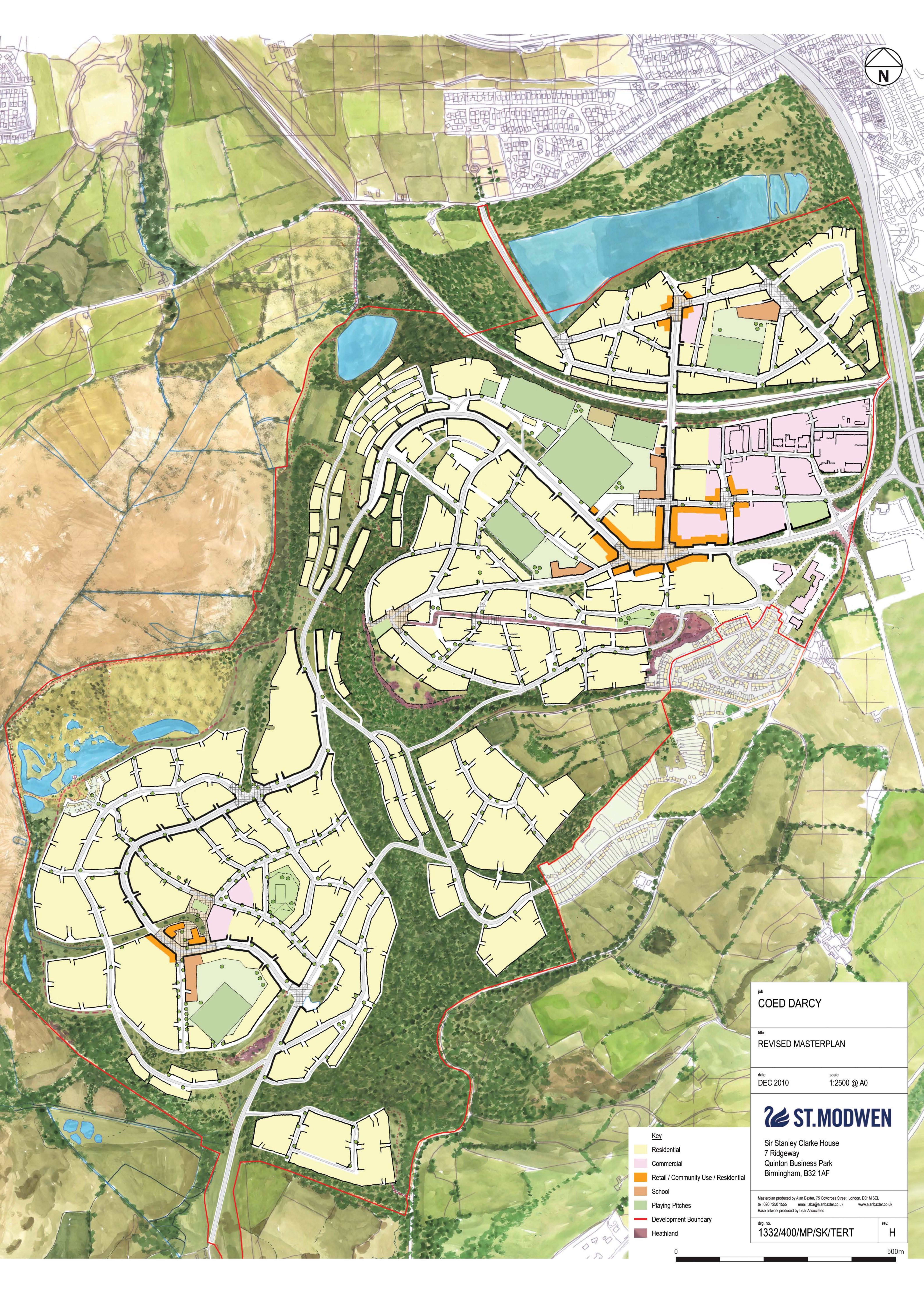




- Key**
- Residential
 - Commercial
 - Retail / Community Use / Residential
 - School
 - Playing Pitches
 - Development Boundary
 - Heathland

job COED DARCY	
title REVISED MASTERPLAN	
date DEC 2010	scale 1:2500 @ A0
 ST.MODWEN	
Sir Stanley Clarke House 7 Ridgeway Quinton Business Park Birmingham, B32 1AF	
Masterplan produced by Alan Baxter, 75 Cowcross Street, London, EC1M 6EL tel: 020 7250 1555 email: aba@alanbaxter.co.uk www.alanbaxter.co.uk Base artwork produced by Lear Associates	
drg. no. 1332/400/MP/SK/TERT	rev. H

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A E I B SC E LE OF T E SECTIO

A REE E T

SCHEDULE 8

Redevelopment Remediation Works

Purpose, objectives and requirements of the Redevelopment Remediation Works

Part 1

1. Purpose and objectives of the Redevelopment Remediation Works

- 1.1 The purpose and objectives of the Redevelopment Remediation Works are the carrying out of all such Remedial Action over and above that actually carried out as part of the RAP Works that is necessary in order to make each part of the Property suitable within the meaning of paragraph 1.2 below for its Intended Use or such other use as may be determined from time to time.
- 1.2 A part of the Property will only be suitable for its Intended Use or such other use as may be determined from time to time if and when the Phase Works Completion Date is declared in respect of that part of the Property.

Part 2

2. Developer's obligations regarding Redevelopment Remediation Works

- 2.1 The Developer shall carry out or procure the carrying out of all Remedial Action necessary in order to achieve the purpose and objectives set out in Part 1 of this Schedule.
- 2.2 The design and specification of the Redevelopment Remediation Works shall take appropriate account of the principles and objectives (as set out in sub-paragraph 1.3 (including 1.3.1-1.3.5 thereof) of Schedule 7 hereto) and the design assumptions of the RAP Works and shall not prejudice the achievement and future sustainability of these principles and objectives of the RAP Works or the RAP Works themselves.
- 2.3 The Redevelopment Remediation Works may reduce the reliance on the RAP Works to achieve the principles and objectives of the RAP Works set out in sub-paragraph 1.3 (including 1.3.1-1.3.5 thereof) of Schedule 7 hereto but must not increase that reliance.
- 2.4 The RBSLs set out in Tables 1 and 2 below and the aesthetic criteria, remediation quality and scope (including the depth below Final Finished Level to which quality standards are achieved) as also set out in Part 3 below, as the same may be varied in accordance with this Schedule 8, shall be achieved for each part of the Property at the minimum validation frequencies set out in clause 8 of Part 3 (as applicable depending upon whether such part of the Property is intended for use as residential, commercial or recreational land) as a minimum base level standard.
- 2.5 Without prejudice to the requirement to achieve the RBSLs set out in Tables 1 and 2 as a minimum base level standard, the Developer shall ensure that all necessary remediation targets are developed and used to determine the extent and quality of remediation appropriate to the development design and purpose of the Urban Village and the Pre-Transfer Date Contamination.
- 2.6 The Developer shall promptly notify CDL and the Monitor if at any time it or any person acting on its behalf identifies a substance present at, in, on or under the

Property, or has reasonable cause to suspect such presence, for which no RBSL is specified in Tables 1 or 2 of Part 3 below in which case the following procedure shall apply:

- 2.6.1 As soon as reasonably practicable after serving a notice under paragraph 2.6 above, the Developer shall prepare proposals for soil and groundwater RBSLs for the substance identified that are consistent with the purpose and objectives of the Redevelopment Remediation Works as set out in Part 1 of this Schedule and the standards of prevailing Environmental Law and shall provide a copy of such proposals to CDL the Monitor and the Authority. Any such proposal shall contain a detailed statement of the health risk assessment and general methodology from which the proposed RBSLs have been derived.
 - 2.6.2 Not earlier than 10 Working Days after submitting its proposals to CDL the Monitor and the Authority in accordance with sub-paragraph 2.6.1 above, the Developer shall submit a written request to the appropriate Environmental Authorities, copied at the same time to CDL the Monitor and the Authority, for approval of the use of the proposed RBSLs. The Developer shall provide to the appropriate Environmental Authorities with its request copies of the health risk assessment and general methodology referred to in sub-paragraph 2.6.1 above and a copy of this Agreement clearly drawing attention to the purpose, objectives and requirements of the Redevelopment Remediation Works set out therein and the proposed changes thereto.
 - 2.6.3 Each of the Developer, CDL and the Monitor shall be free at any time to make such submissions to the appropriate Environmental Authorities in relation to the Developer's proposals as they see fit, provided such submissions are made in writing and copied to each other and the Authority at the same time.
 - 2.6.4 The Developer shall ensure that the Redevelopment Remediation Works achieve compliance with any RBSLs approved in writing by the appropriate Environmental Authorities pursuant to this paragraph 2.6, as if they were also set out in Tables 1 and 2 of Part 3 of this Schedule.
- 2.7 The Developer may at any time propose variations to the requirements of clauses 3 to 8 inclusive of this Schedule 8 below to the appropriate Environmental Authorities and to the Authority pursuant and to the extent required to comply with the Planning Permission to take account of changes of circumstances since the date of this Agreement, provided no variation shall be proposed that is in any way prejudicial to the achievement of the purpose and objectives of the Redevelopment Remediation Works as set out in Part 1 above and, in particular, the achievement of the RBSLs set out in Tables 1 and 2 above (as previously amended in accordance with paragraph 2.6 above if applicable) and provided further that
- 2.7.1 Any such proposals shall be submitted in writing to CDL the Monitor and the Authority at least 10 Working Days before they are submitted to any Environmental Authority;
 - 2.7.2 Any such proposal submitted to any Environmental Authority shall be copied to CDL the Monitor and the Authority at the same time;
 - 2.7.3 The Developer shall enclose a copy of this Agreement with any such proposal made to any Environmental Authority clearly drawing attention to the

purpose, objectives and requirements of the Redevelopment Remediation Works set out therein and the proposed changes thereto;

- 2.7.4 Each of the Developer, CDL and the Monitor shall be free to make such submissions to the appropriate Environmental Authorities in relation to the Developer's proposals as they see fit, provided such submissions are made in writing and copied to each other and the Authority at the same time.
 - 2.7.5 Subject to paragraph 2.7.6 no such proposed variation shall be implemented unless, it has been approved in writing by the appropriate Environmental Authorities in accordance with the requirements of this clause 2.7.
 - 2.7.6 If the Developer has only oral approval (or non objection) to a proposed variation from the relevant Environmental Authorities, no such proposed variation shall be implemented unless the Developer notifies the relevant Environmental Authorities in writing (copied at the same time to CDL the Monitor and the Authority) that it proposes to proceed with the implementation of the proposed variation to the Redevelopment Remediation Works 10 Business Days after the date of such notice and no written objections of any relevant Environmental Authority are received within such 10 Business Day period in respect of the same.
 - 2.7.7 Any reference in this Agreement to the Redevelopment Remediation Works shall be to the Redevelopment Remediation Works as varied in accordance with this paragraph 2.
- 2.8 The Developer shall, and shall procure that any person acting on its behalf in relation to any aspect of the Redevelopment Remediation Works required by this Schedule 8 shall, at all times comply with the requirements of Schedule 10 (General Remediation Requirements).

Part 3

Table 1 – Summary of Soil RBSLs

Contaminant	Land-Use Specific Soil RBSL Surface to 1m below FFL (mg/kg) ¹			Land-Use Specific RBSL Soil below 1m depth (mg/kg)		
	Residential	Commercial	Recreational	Residential	Commercial	Recreational
METALS & METALLOIDS						
Arsenic	64	500	64	-	-	-
Cadmium	2.6	1400	2.6	-	-	-
Chromium	130	5000	200	-	-	-
Mercury	1	480	1	-	-	-
Nickel	50	5000	75	-	-	-
Selenium	3	8000	3	-	-	-
Lead	337	750	337	-	-	-
Vanadium	416	16000	640	-	-	-
Copper	478	-	478	-	-	-
Zinc	200	-	200	-	-	-
ORGANIC SPECIES						
Benzene	0.12	5	13	0.4	5	48
Benzo(a)pyrene ²	0.9	29	0.9	none	none	none
Toluene	36	1160	8110	52	389	none
Ethylbenzene	41	122000	4740	140	none	none
Xylenes	32	121000	7940	58	none	none
1,2-Dichloroethane	0.04	2	4.5	0.1	0.65	6
Dichloromethane	5	1650	241	84	665	6220
Tetrachloroethene	11	1050	641	34	368	1780
Trichloroethene	1	84	193	2	28	269
Vinyl Chloride	0.01	4	0.7	0.04	1.6	16
1,2 Dichloroethene	4	273	632	7	91	881
1,1,1-Trichloroethane	154	577000	27900	160	3250	none
TPH Aromatic EC>C7-C8	125	1840	21337	146	617	none
TPH Aromatic EC>C8-C10	94	913	4025	257	547	none
TPH Aromatic EC>C10-C12	118	26515	4589	1394	none	none
TPH Aromatic EC>C12-C16	131	64875	4799	none	none	none
TPH Aromatic EC>C16-C21	82	51449	3639	none	none	none
TPH Aromatic EC>C21-C35	1130	51449	3639	none	none	none

TPH Aliphatic EC>C6-C8	8335	8517587	606191	none	none	none
TPH Aliphatic EC>C8-C10	112	158890	12075	158	none	none
TPH Aliphatic EC>C10-C12	3204	163360	12094	none	none	none
TPH Aliphatic EC>C12-C16	4513	169032	12117	none	none	none
TPH Aliphatic EC>C16-C21	94174	3429944	242573	none	none	none
TPH Aliphatic EC>C21-C35	94820	3429944	242573	none	none	none
Total TPH (Phase 1) ³	1717	81413	9061	9182	81956	none
Total TPH (Process Area) ³	2601	44344	10830	4098	35014	none
Total TPH (North Tank Farm) ³	1104	25875	9419	3802	13974	none
Total TPH (South Tank Farm) ²	1015	37230	6349	2792	34797	none
ASBESTOS						
Sum of all Types of ACM	200	300	200	200 ⁴	-	-

“-“ value not applicable to scenario

“none” RSBL value exceeds soil saturation limits and free phase assessment appropriate

¹ Lower value of human health RBSL or Soil Code value if higher than background LCL value (applicable to metals & metalloids only)

² Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach

³ ‘Total’ TPH RBSL derived for an area of development, based on individual RBSLs provided and available mass fraction TPH data in soil at time of derivation, using the inverse weighted average approach.

⁴ See text below for specification of relevant depth ranges

Table 2 – Summary of RBSLs for Groundwater

Contaminant	Land-Use Specific RBSL (mg/l)		
	Residential	Commercial	Recreational
TPH Aliphatic EC>C6-C8	none	none	none
TPH Aliphatic EC>C8-C10	none	none	none
TPH Aliphatic EC>C10-C12	none	none	none
TPH Aliphatic EC>C12-C16	none	none	none
TPH Aliphatic EC>C16-C21	none	none	none
TPH Aliphatic EC>C21-C35	none	none	none
TPH Aromatic EC>C7-C8	20	97	none
TPH Aromatic EC>C8-C10	22	none	none
TPH Aromatic EC>C10-C12	none	none	none
TPH Aromatic EC>C12-C16	none	none	none
TPH Aromatic EC>C16-C21	none	none	none
TPH Aromatic EC>C21-C35	none	none	none
Benzene	0.7	6	198
Benzo(a)pyrene	none	none	none
Toluene	47	229	none
Ethylbenzene	102	506	none
Xylenes	43	607	none
1,2-Dichloroethane	0.2	0.82	45
Dichloromethane	150	624	none
Tetrachloroethene	22	115	none
Trichloroethene	2.6	13	813
Vinyl Chloride	0.06	0.3	18
1,2-Dichloroethene	15	68	none
1,1,1-Trichloroethane	193	989	none

“none”= theoretical RBSL greater than solubility limit

3. Scale of aesthetic criteria

Table 3 – Scale of aesthetic criteria

Class	Visual	Olfactory
0	No visible staining of soil, no visible suspect ACM	No detectable odour on soil
1	Occasional staining of soil, no visible suspect ACM	Faint odour on soil
2	Frequent staining of soil	Distinct but not strong odour on soil
3	Occasional heavy staining of soil	Strong odour on soil
4	Heavy staining of soil	Strong odour discernable in ambient air
5	Visible hydrocarbon product	Overwhelming Odour

3.1 Visible suspect ACM refers to asbestos containing material visible to the naked eye which a reasonable and prudent person used to managing asbestos may suspect to be asbestos containing.

3.2 All references in Table 1 above to depths to which minimum RBSLs are to be achieved are expressed below, relative to FFL following completion of construction of the intended Urban Village.

4. Residential End-Use where Groundwater is Primarily in Rock

4.1 This remediation scenario is intended to refer to residential end-use in areas where there is limited soil material over bedrock, little perched groundwater is present in that soil, and the water table is normally first encountered in bedrock. Areas of the Property with these characteristics include the more elevated parts of the former process area and of the southern tank farm. The minimum Remedial Action required in this scenario is as follows:

4.2 All oil saturated soil should be removed.

4.3 All soils must be remediated so as to meet the RBSLs for TPH, BTEX and PAHs at the relevant depth relative to FFL and the aesthetic criteria Class 2 or better at greater than 1m below FFL.

4.4 The aesthetic quality of soils shall be Class 1 or better for at least the first metre below FFL.

4.5 Soils where there is visible ash and clinker, or metal concentrations above RBSLs, are to be removed so that none is retained within the first metre below FFL in garden areas.

4.6 Where it is not practicable to address groundwater contamination within bedrock this must be controlled, e.g. where seeps, sheens and iron staining discharge from the bedrock. Acceptable methodologies for remediation may include, but are not limited to, the use of land drainage via interceptors. Control measures should result in no visible discharge at surface and little or no odour observable.

4.7 All soil potentially containing dispersed asbestos fibres or visible ACM must be removed or remediated to meet in bulk, considering both dispersed fibres and pieces

of ACM, the appropriate ACM RBSL, or to meet the requirements of relevant Environmental Authorities, whichever is the more conservative.

5. Residential End-Use where Groundwater is in soil

- 5.1 This remediation scenario is intended to refer to residential end-use in areas where there is sufficient soil material over bedrock to commonly contain perched groundwater such that the water table is normally first encountered in soil. Areas of the Property with these characteristics include the lower parts of the former process area and of the southern tank farm and the north site tank farm. The minimum Remedial Action required in this scenario is as follows.
- 5.2 All oil saturated soils and free product shall be removed.
- 5.3 Soils must be remediated so as to meet the RBSLs for TPH, BTEX and PAHs to a minimum depth of 0.5m below the likely seasonal minimum groundwater depth following development of the intended Urban Village. This depth is to be established by consideration of all available groundwater level monitoring data relevant for each area. All soil must meet aesthetic criteria Class 2 or better to the same depth.
- 5.4 All soil must meet aesthetic criteria Class 1 or better to at least 1m below FFL.
- 5.5 Soils where there is visible ash and clinker or metal concentrations above RBSLs to be replaced to at least 1m below FFL.
- 5.6 All soil potentially containing dispersed asbestos fibres or visible ACM must be removed or remediated to meet in bulk, considering both dispersed fibres and pieces of ACM, the appropriate ACM RBSL, or the requirements of relevant Environmental Authorities, whichever is the more conservative, to a minimum depth of 2m below FFL.
- 5.7 Where there is a risk of the migration in ground of hazardous gas or vapour or contaminated liquid into remediated areas, the Developer shall take all necessary measures appropriate to prevent this occurring, including monitoring whatever measures are put in place after their installation to continue to demonstrate their effectiveness. Such measures could include the installation of interception trenches and management of discharge from these.
- 5.8 Where necessary, seeps, sheens and iron rich discharges from the bedrock must be permanently controlled such that there is no visible discharge at surface and little or no odour detectable. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.

6. Commercial End-Use where Groundwater is in soil

- 6.1 This remediation scenario is intended to refer to commercial end-use in areas where there is sufficient soil material over bedrock to commonly contain perched groundwater such that the water table is normally first encountered in soil. The area identified for commercial development in the Masterplan is the lower part of the former process area, which in general terms has these characteristics. Based on the Masterplan, no commercial developments are currently envisaged where groundwater is primarily encountered only in rock; in the event such development is proposed, Remedial Action consistent with the standards specified below would be required, adapted as necessary to local conditions.

- 6.2 All oil saturated soils and soil containing free product other than minor sheens shall be removed to a minimum depth of 2 m FFL or 0.5 m below the likely lowest seasonal groundwater elevation following development of the intended Urban Village, whichever is the deeper. This depth is to be established by consideration of all available groundwater level monitoring data.
- 6.3 All soils must meet the RBSL for TPH to at least 1m below FFL.
- 6.4 All soils must meet in bulk, considering both dispersed fibres and pieces of ACM”, the RBSL for ACM to at least 1m below FFL and any visible ACM encountered during construction in the first 1m below FFL is to be removed.
- 6.5 Where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring. Such measures could include the installation of interception trenches and management of discharge from those. The Developer shall monitor whatever measures are put in place after their installation to continue to demonstrate their effectiveness.
- 6.6 Where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.

7. Public Open Space

- 7.1 The Developer shall remediate areas of the Property which will not be developed for residential or commercial end-uses based on those areas falling into one of the following three broad categories of land-use:
- 7.1.1 Well managed parks and public gardens;
- 7.1.2 More lightly managed areas where public access is encouraged;
- 7.1.3 Areas to which access is discouraged but occasional access and/or trespassing is possible.
- 7.2 The degree of protection that will need to be afforded to people will be largely dependent upon how the access to these areas is encouraged/discouraged and managed. For guidance only, access may be discouraged by physical barriers such as fencing, or vegetation, or actively managed by the provision of walkways along which controlled access is encouraged. The topography of the site may encourage children to use bikes, potentially causing rutting of the ground surface and exposing soils at depth. Detailed designs in this regard will be prepared by the Developer approved by CDL and agreed with the Environmental Authorities to (i) protect human health considering the reasonably anticipatable use of the land (ii) achieve the relevant RBSLs (recreational RBSLs being provided in Table 1 above) to an appropriate depth and (iii) include an appropriate scheme of validation testing.

8. Validation

- 8.1 As a minimum validation of RBSL's will be required to include:
- 8.1.1 Determining the necessary extent of remedial excavations: this will be the responsibility of the Developer;

- 8.1.2 Quality assurance of imported materials, including testing of imported materials for contamination if it is intended to use reclaimed aggregates, top soil, etc: this will be the responsibility of the Developer, however, CDL may elect to validate such materials in-situ, once they are finally placed for construction;
- 8.1.3 Quality assurance of soils treated on the site for re-use: this will be the responsibility of the Developer, however, CDL will validate such materials in-situ, once they are finally placed for construction, and;
- 8.1.4 Quality assurance of soils for which no remedial works are identified: this will be the responsibility of the Developer, however, CDL will validate such materials.

8.2 As a minimum, sampling at the following frequencies should be undertaken.

Table 4 - Minimum Validation Testing Frequencies.

Testing for the Validation Suite at the following frequency:	Shallow Soils (Residential <1m FFL)	Deeper Soils (Residential >1m below FFL)	Soils (Commercial all relevant depths)
Imported quarried material	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples
Imported soil from verified greenfield site	1 per 250m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples
Imported soil from characterised brownfield site ¹	1 per 25m ³ ex situ, composite of 5 sub-samples	1 per 50m ³ ex situ, composite of 5 sub-samples	1 per 100m ³ ex situ, composite of 5 sub-samples
0.5-1m below FFL in-situ	Regular grid of 1 per 50m ² , sample over 0.5m depth	n/a	Regular grid of 1 per 400m ² , sample over 0.5m depth
>1m below FFL in-situ	n/a	Regular grid of 1 per 100m ² , sample over 1m depth	Regular grid of 1 per 400m ² , sample over 0.5m depth
Stockpiled excavated site materials for re-use	1 per 50m ³ ex situ, composite of 5 sub-samples	1 per 100m ³ ex situ, composite of 5 sub-samples	1 per 400m ³ ex situ, composite of 5 sub-samples
Face of remedial excavations <1m deep	1 per 10m, minimum of 1 per face, worst case VO sample	n/a	1 per 15m, minimum of 1 per face, worst case VO sample
Face of remedial excavations >1m deep	n/a	1 per 10m ² , minimum of 1 per face, worst case VO sample	1 per 15m ² , minimum of 1 per face, worst case VO sample
Along redundant service excavations	1 per 20m of trench, worst case VO sample	1 per 20m of trench, worst case VO sample	1 per 20m of trench, worst case VO sample
Soil treated ex-situ and homogenised	1 per 200m ³ , composite of 5 regular sub-samples	1 per 200m ³ , composite of 5 regular sub-samples	1 per 500m ³ , composite of 5 regular sub-samples

¹ Validation suite to reflect prior use of the originating brownfield site and the design and purpose of the relevant area of Coed Darcy.

VO = visual / olfactory (ie aesthetic) observation

- 8.3 The quality of all material placed as fill and/or remaining in-situ post-construction of the Urban Village must as a minimum meet the relevant RBSLs and aesthetic standards at the frequencies set out above (in either case as the same may be amended in accordance with this Schedule).
- 8.4 In all circumstances, CDL and/or the Monitor may at its discretion take additional samples if it has reason to suspect that material may not meet the relevant RBSLs and

aesthetic standards (in either case as the same may be amended in accordance with this Schedule).

- 8.5 All validation samples obtained by CDL and/or the Monitor whether according to the above frequencies or on a discretionary basis must on analysis be of the same or better quality than the relevant RBSLs and meet or exceed the relevant aesthetic criteria (in either case as the same may be amended in accordance with this Schedule).

A E I C I FOR ATIO SO RCES

A E I RS RFIs

From: Rhys Mander
To: ["Lee, Michelle"](#)
Cc: [Poland, Michael](#)
Subject: Coed Darcy Monitor RFI108 - RE: Coed Darcy_Monitor Phase 22
Date: 18 October 2012 16:21:00

Michelle

I have reviewed the validation report for the Cordon Sanitaire (Monitor Phase 22) and I have the following comments:

- As the proposed development layout is not yet known, please could you confirm how the FFLs have been determined. Is the depth of the remediation excavation considered conservative?
- Please could you provide an isopachyte drawing to compare the depth of the remediation excavation to the FFLs. Please could the isopachyte be banded in 0.5m intervals.
- Please could a copy of drawing 1280 be included in the report appendices (to make future referencing easier).
- The report discusses the presence of product in MSMW143 but there does not appear to have been any effort to delineate the extent of the free phase product. Please discuss. Please also provide further details about how the product was recovered between April and May 2012 and whether the method used was the most appropriate. The report says that there is now 5-10mm of product, whereas the table on page 131 of 132 suggests that on 8 August 2012 there was 100mm.
- The photos show tank bases but the report makes no mention of these. Could these have contributed to the product and impacted materials that were observed? It would be useful if the location of the tank bases could be indicated on one of the drawings.
- The report states that the presence of product was consistent with the stains and seepages noted in Monitor Phase 3 (Persimmon Phase 1A). How have these been managed? Are they likely to have any post-development implications?
- The report does not appear to include a v/o assessment.
- The report states that heavily stained materials were removed for treatment elsewhere. What volume of material was removed?
- Please could you confirm the surface area of the plot and the number of samples collected (it looks like 9) to confirm that a 20m x 20m grid has been achieved.
- Please confirm the depth at which the validation samples were collected.
- Were the sides of the excavation validated as per the frequencies in Table 5.1?
- Were any service lines removed? If so, were they validated as per the frequencies in Table 5.1?
- The logs in Appendix B appear to be geotechnical logs only with no environmental observations or measurements. Also, it's not clear which logs are pre-remediation and which are post-remediation.
- No logs are provided for the older wells MSMW143, MSTP295, MSTP154.
- Was any asbestos screening done?

Regards

Rhys Mander MEng CEng MCIHT
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A E I E HISTORICAL A S



A E I F CO ARISO OF RBSLs A RTCs

Contaminant	RTC (mg/l)
TPH aliphatic C10-C12	>sat
TPH aliphatic C12-C16	>sat
1,2-Dichloroethane	4.80E+00
1,1,1-Trichloroethane	>sat
Tetrachloroethene	>sat
Trichloroethene	2.85E+01
Vinyl chloride	3.38E-01
Dichloromethane	1.98E+03
Cis-1,2 Dichloroethene	7.40E+01
Trans-1,2 Dichloroethene	8.91E+01
1. Where the lower of the vapour or aqueous saturation limits has been exceeded by the RTC calculated, the hazard quotient is considered to be less than 1 and as such >sat has been presented 2. Xylene - the lowest RTC of the three isomers has been presented. Users must consider total exposure from all xylene isomers and not consider them in isolation 3. TPH aromatic C7-C8 is considered to comprise toluene only by Atkins 4. The potential presence of free product should be assessed in accordance with information in the S106 (Ref. 1).	

4. Comparison of RBSLs and RTC

As an objective of these works was to establish whether the RBSLs were health protective, the commercial RBSLs and RTC have been compared. This comparison is presented in the tables in this section of the report. As per the approach adopted for the residential and recreational RTC, within the tables within this section, the lower of the RBSL/RTC has been bolded. Therefore where the RBSL has been bolded, it is protective in comparison to the RTC:

- If the RBSL and the RTC are equal, the RBSL is bolded.
- If the RTC is lower than the RBSL, the RTC is bolded⁹.
- If the RBSL is lower than the RTC, the RBSL is bolded.

Where the RTC are greater than the RBSL or the RTC are equal to the RBSL, the values have been marked as final to illustrate that the RBSL is protective. Where the RTC are lower than the RBSL, further site specific modifications could be considered to establish whether the RTC is unnecessarily conservative and these have been marked as draft. Further site specific modifications have not been considered at the present stage.

The RBSL should be used in all cases, except where the RTC is bolded. In this event, the relevant RTC should therefore be adopted.

The background soil concentration and Soil Code have not been considered within the metals RTC presented and therefore the values presented for metals may not be protective of phytotoxic

⁹ In some cases there may be two RTC, where one RTC is higher than the RBSL and the other lower: one may be bolded and the other not and therefore they remain as draft.

effects. The soft landscaping areas should therefore be suitably designed at the remediation design stage, once such areas are defined.

4.1 Comparison of commercial RBSLs and RTC (shallow soil)

The commercial RBSLs and RTC for a shallow soil source are compared in Table 4.1 below.

Table 4.1 – Comparison of commercial RBSLs and RTC for shallow soil (0.65m below FFL)

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
Arsenic	5.00E+02	6.35E+02	6.35E+02	final
Chromium	5.00E+03	3.65E+02	3.65E+02	draft
Cadmium	1.40E+03	2.43E+02	2.43E+02	draft
Mercury (inorganic)	4.80E+02	3.71E+03	3.71E+03	final
Nickel	5.00E+03	1.99E+03	1.99E+03	draft
Selenium	8.00E+03	1.30E+04	1.30E+04	final
Lead	7.50E+02	5.45E+03	5.45E+03	final
Vanadium	1.60E+04	7.59E+03	7.59E+03	draft
Copper	-	1.15E+05	1.15E+05	draft
Zinc	-	9.18E+05	9.18E+05	draft
Benzo(a)pyrene	2.90E+01	2.47E+01	2.48E+01	draft
Benzene	5.00E+00	1.78E+01	9.98E+01	final
Toluene	1.16E+03	4.18E+05 a	4.22E+05 a	final
Ethylbenzene	1.22E+05	1.83E+05 a	1.87E+05 a	final
Xylene	1.21E+05	2.93E+05 a	3.27E+05 a	final
TPH aromatic C7-C8	1.84E+03	4.18E+05 a	4.22E+05 a	final
TPH aromatic C8-C10	9.13E+02	6.21E+04 a	6.62E+04 a	final
TPH aromatic C10-C12	2.65E+04	6.83E+04 a	6.84E+04 a	final
TPH aromatic C12-C16	6.49E+04	6.84E+04 a	6.57E+04	final
TPH aliphatic C6-C8	>1.00E+06	≤1.00E+06 a	≤1.00E+06 a	draft
TPH aliphatic C8-C10	1.59E+05	1.69E+05 a	1.70E+05 a	final
TPH aliphatic C10-C12	1.63E+05	1.71E+05 a	1.71E+05 a	final
TPH aliphatic C12-C16	1.69E+05	1.71E+05 a	1.71E+05 a	final
TPH aromatic C16-C21	5.14E+04	2.85E+04	2.85E+04	draft
TPH aromatic C21-C35	5.14E+04	2.85E+04	2.85E+04	draft
TPH aliphatic C16-C21	>1.00E+06	≤1.00E+06	≤1.00E+06	draft
TPH aliphatic C21-C35	>1.00E+06			draft
Total TPH (Phase 1)	8.14E+04	Not calculated (see note 8)		
Total TPH (Process Area)	4.43E+04			
Total TPH (North Tank Farm)	2.59E+04			

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
Total TPH (South Tank Farm)	3.72E+04			
1,2-Dichloroethane	2.00E+00	4.01E-01	2.15E+00	draft
1,1,1-Trichloroethane	5.77E+05	4.43E+02	3.14E+03	draft
Tetrachloroethene	1.05E+03	1.03E+02	7.88E+02	draft
Trichloroethene	8.40E+01	7.48E+00	5.49E+01	draft
Vinyl chloride	4.00E+00	4.50E-02	1.74E-01	draft
Dichloromethane	1.65E+03	1.58E+02	7.34E+02	draft
Cis-1,2-Dichloroethene	2.73E+02	8.70E+00	5.30E+01	draft
Trans-1,2 Dichloroethene		1.38E+01	8.77E+01	draft
Notes				
a) based on a value produced from following the approach outlined in SR4 for substances at saturation				
1. It is assumed that no visible free product is present within the top 1.0m of soil The presence of free product should be assessed in accordance with information in the S106 (Ref. 1).				
2. Xylene - the lowest RTC of the three isomers has been presented. Users must consider total exposure from all xylene isomers and not consider them in isolation				
3. TPH aromatic C7-C8 is considered to comprise toluene only by Atkins				
4. In the S106 (Ref. 1), only one value was presented for 1,2-dichloroethene of 273 mg/kg				
5. 'Total' TPH RBSL derived for an area of development, based on individual RBSL and available mass fraction TPH data in soil at time of derivation, using the inverse weighted average approach.				
6. Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach				
7. No RTC was produced for total TPH as this will be considered further at validation stage				
8. Asbestos has not been considered here as it is being considered in a separate report				
9. Additivity for TPHs and PAHs to be undertaken in line with guidance in this report				
10. In the S106 (Ref. 1), “-“ was presented for the RBSLs for copper and zinc for a commercial land use				
11. The values for metals may not be protective of phytotoxic effects				

4.2 Comparison of commercial RBSLs and RTC (deep soil)

The commercial RBSLs and RTC for a deep soil source are compared in Table 4.2 below.

Table 4.2 – Comparison of commercial RBSLs and RTC for deep soil (1m below FFL)

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sandy loam (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/final
Benzo(a)pyrene	None	>sat	>sat	final
Benzene	5.00E+00	7.10E+01	1.52E+02	final
Toluene	3.89E+02	>sat	>sat	final
Ethylbenzene	None	>sat	>sat	final
Xylene	None	>sat	>sat	final

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sandy loam (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/final
TPH aromatic C7-C8	6.17E+02	>sat	>sat	final
TPH aromatic C8-C10	5.47E+02	>sat	>sat	final
TPH aromatic C10-C12	None	>sat	>sat	final
TPH aromatic C12-C16	None	>sat	>sat	final
TPH aliphatic C6-C8	None	>sat	>sat	final
TPH aliphatic C8-C10	None	>sat	>sat	final
TPH aliphatic C10-C12	None	>sat	>sat	final
TPH aliphatic C12-C16	None	>sat	>sat	final
TPH aliphatic C16-C21	None	Not calculated (see note 3)		
TPH aliphatic C21-C35	None			
TPH aromatic C16-C21	None			
TPH aromatic C21-C35	None			
Total TPH (Phase 1)	8.20E+04	Not calculated (see note 9)		
Total TPH (Process Area)	3.50E+04			
Total TPH (North Tank Farm)	1.40E+04			
Total TPH (South Tank Farm)	3.48E+04			
1,2-Dichloroethane	6.50E-01	1.73E+00	2.75E+00	final
1,1,1-Trichloroethane	3.25E+03	>sat	>sat	final
Tetrachloroethene	3.68E+02	3.98E+02	1.06E+03	final
Trichloroethene	2.80E+01	2.88E+01	7.07E+01	final
Vinyl chloride	1.60E+00	1.54E-01	2.14E-01	draft
Dichloromethane	6.65E+02	6.77E+02	9.76E+02	final
Cis-1,2-Dichloroethene	9.10E+01	3.51E+01	6.70E+01	draft
Trans-1,2 Dichloroethene		5.34E+01	1.11E+02	draft
Notes				
1. Where the lower of the vapour or aqueous saturation limits have been exceeded by the RTC calculated, the hazard quotient is considered to be less than 1 and as such >sat has been presented				
2. Xylene - the lowest RTC of the three isomers has been presented. Users must consider total exposure from all xylene isomers and not consider them in isolation				
3. TPH >C16 are not considered to be volatile according to the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG). Consequently the inhalation of vapour pathways have not been considered and therefore no RTC value has been presented here				
4. “None” indicates theoretical RBSL greater than solubility limit				
5. In the S106 (Ref. 1), only one value was presented for 1,2-dichloroethene of 91 mg/kg				
6. ‘Total’ TPH RBSL derived for an area of development, based on individual RBSL and available mass fraction TPH data in soil at time of derivation, using the inverse weighted average approach.				
7. Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach				

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sandy loam (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/final
8. TPH aromatic C7-C8 is considered to comprise toluene only by Atkins				
9. No RTC was produced for total TPH as this will be considered further at validation stage				
10. Asbestos has not been considered here as it is being considered in a separate report				
11. Additivity for TPHs and PAHs to be undertaken in line with guidance in this report				
12. The potential presence of free product should be assessed in accordance with information in the S106 (Ref. 1).				

4.3 Comparison of commercial RBSLs and RTC (groundwater)

The commercial RBSLs and RTC for a groundwater source are compared in Table 4.3 below.

Table 4.3 – Comparison of commercial RBSLs and RTC for groundwater (1m below FFL)

Contaminant	S106 RBSL (mg/l)	RTC (mg/l)	Draft/Final
Benzo(a)pyrene	None	>sat	final
Benzene	6.00E+00	1.15E+01	final
Toluene	2.29E+02	>sat	final
Ethylbenzene	5.06E+02	>sat	final
Xylene	6.07E+02	>sat	final
TPH aromatic C7-C8	9.70E+01	>sat	final
TPH aromatic C8-C10	None	>sat	final
TPH aromatic C10-C12	None	>sat	final
TPH aromatic C12-C16	None	>sat	final
TPH aromatic C16-C21	None	Not calculated (see note 6)	final
TPH aromatic C21-C35	None		final
TPH aliphatic C6-C8	None	>sat	final
TPH aliphatic C8-C10	None	>sat	final
TPH aliphatic C10-C12	None	>sat	final
TPH aliphatic C12-C16	None	>sat	final
TPH aliphatic C16-C21	None	Not calculated (see note 6)	final
TPH aliphatic C21-C35	None		final
1,2-Dichloroethane	8.20E-01	4.80E+00	final
1,1,1-Trichloroethane	9.89E+02	>sat	final
Tetrachloroethene	1.15E+02	>sat	final
Trichloroethene	1.30E+01	2.85E+01	final
Vinyl chloride	3.00E-01	3.38E-01	final
Dichloromethane	6.24E+02	1.98E+03	final

Contaminant	S106 RBSL (mg/l)	RTC (mg/l)	Draft/Final
Cis-1,2 Dichloroethene	6.80E+01	7.40E+01	final
Trans-1,2 Dichloroethene	6.80E+01	8.91E+01	final
Notes			
1. Xylene - the lowest RTC of the three isomers has been presented. Users must consider total exposure from all xylene isomers and not consider them in isolation			
2. TPH aromatic C7-C8 is considered to comprise toluene only by Atkins			
3. "None" indicates theoretical RBSL greater than solubility limit			
4. In the S106 (Ref. 1), only one value was presented for 1,2-Dichloroethene of 68 mg/l.			
5. Where indoor and outdoor values were presented by RBCA, these have been integrated in line with SNIFFER (2003). Where both indoor and outdoor values derived by RBCA were greater than the saturation limit, >sat has been presented. Where indoor values were presented by RBCA, and the outdoor values were >sat, only the indoor values have been presented. Therefore >sat indicates that the theoretical RTC is greater than solubility limit.			
6. TPH >C16 are not considered to be volatile according to TPHCWG. Consequently the inhalation of vapour pathways have not been considered			
7. The potential presence of free product should be assessed in accordance with information in the S106 (Ref. 1).			

5. Conclusions and Recommendations

5.1 Commercial RTC

5.1.1 Conclusions

RTC have been derived for a shallow and deep soil source for a commercial land use. As can be seen in Section 4, some RTC were higher than the RBSL and thus the RBSLs would be protective and suitable for use.

In other cases, the RTC were lower than the RBSL and therefore may not be protective of human health based on the assumptions underpinning the RTC. In such cases the RTC have been marked as draft and may require further assessment.

5.1.2 Recommendations

The lower of the RTC/RBSL is recommended for use in order to be protective for the receptor at the site. It is also recommended that the land use assumptions used to develop the CSM are compared to the development plans to establish whether the RTC are suitable for use. For instance, a less permeable soil type than the sand/sandy loam used within the RTC modelling, may result in a higher RTC and less remediation being required. Information regarding the application of the RTC/RBSL is understood to be presented within the remedial strategy and validation plans (as appropriate).

Should exceedances of the RTC/RBSL be reported, it is recommended that the guidelines outlined in the validation plan (in preparation) are followed.

A number of approaches could be considered for those contaminants where the RTC is lower than the RBSL. The recommended approaches include:

- consideration of building development plans on plot specific basis (e.g. areas of hard standing) versus exceedances of RTC/RBSL;

- inorganic substances: where the dermal pathway contributes significantly to exposure, the assumptions behind the dermal absorption factor (DAF) could be re-visited;
- depth to groundwater: where the depth to groundwater is deeper than assumed in the RTC, depth specific RTC could be modelled¹⁰;
- where the additive TPH hazard quotient is exceeded, Raoult's law and a limit on solubility could be incorporated;
- where the RTC is much lower than the RBSL: the toxicology used in the RTC could be compared to that used in the RBSL. It is possible that there may be double counting of background exposure (e.g. TPH RTC), or further information relating to the source of the contaminant upon the site (e.g. knowledge that all vanadium is definitely vanadium pentoxide);
- further evaluation of those assessment criteria which were 'orange' in the CLEA modelling;
- where the RTC is much lower than the RBSL: the physical chemical properties used in the RTC could be compared to those used in the RBSL to establish the impact of the difference; and
- where the RTC is much lower than the RBSL: the changes to the guidance could be reviewed to establish the reason for this change.

In conjunction with these, background soil data for the Swansea area could also be considered to establish whether the RBSL/RTC are more stringent than concentrations of background soil within the local area. This was undertaken for some of the metals in the residential and recreational RTC and may prove useful for the commercial land use. This may also prove useful for other substances, such as PAHs.

In some cases, statistical methods could also be used to assess any exceedances in the context of the whole dataset.

¹⁰ Should groundwater be present shallower than 1m bgl, further assessment may be required as the RTC may not be sufficiently protective. Where surface water is baseflow fed, further assessment may also be required

COED DARCY MONITOR

PHASE 28 COMMERCIAL AREA RRWCC

JULY 2015

49310747 / BRRP00041 / CERT 28B

***PREPARED FOR:
Coed Darcy Limited***

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FINAL

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Scope

This Redevelopment Remediation Works Completion Certificate (RRWCC) has been prepared with reference to the following agreements:

- Section 106 Agreement dated 8 February 2008 between Neath Port Talbot Borough Council ("NPTCBC"), St Modwen Developments Limited ("SMD"), St Modwen Properties Plc ("SMP"), BP Oil Llandarcy Refinery Limited ("BPLR") and Coed Darcy Limited ("CDL"); and
- Remediation and Maintenance Agreement dated 23 May 2008 ("RMA") between SMD, SMP and CDL.

Unless advised otherwise, definitions used in this RRWCC can be found in the Section 106 Agreement and/or the RMA.

This RRWCC has been prepared for Phase 28 in response to the receipt of a written request from SMD pursuant to clause 4.3 of the RMA. The Phase Boundary and Intended Use on which this RRWCC is based were notified to the Monitor by letter, a copy of which is provided in **Appendi A**.

The Phase Boundary for Phase 28 is the land edged in red on drawing 5041216-PH2D-DWG-1608, a copy of which is provided in **Appendi A**. The approximate location of Phase 28 in relation to the Development Boundary is shown in **Figure** below. The area of Phase 28 is approximately 6.6 hectares (66,000m²).

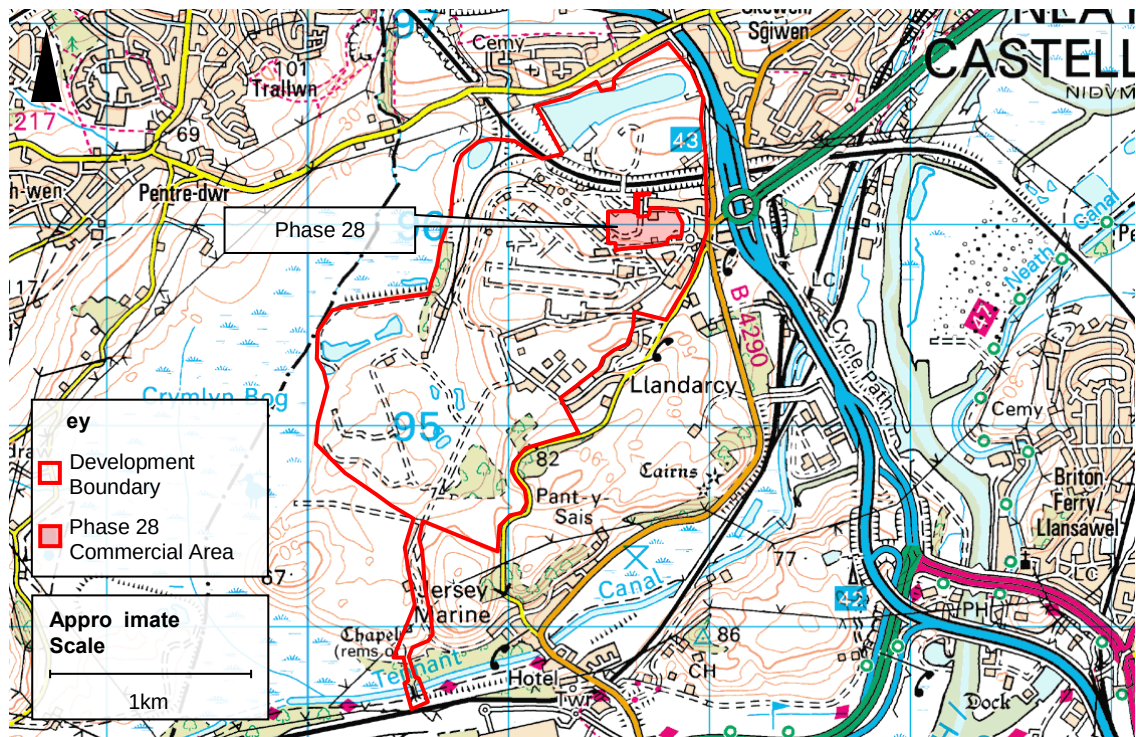


Figure Location plan

The Intended Use for Phase 28 has been declared as "a proposed commercial area, including roads, with associated embankments and utilities installation". With reference to the

definitions provided in the Section 106 Agreement, this is considered to comprise a commercial phase.

Although a development layout is yet to be confirmed, an outline layout is shown on the current masterplan drawing reference 1332/400/MP/SK/TERT Revision H, a copy of which is provided in **Appendi A**.

It is noted that the masterplan indicates some residential development within the phase boundary. Depending on the nature of this residential development further remediation works may be required given that this certificate has been prepared for a commercial end use. If however the proposed residential development were to comprise living spaces from the first-floor upwards (for example flats above shops) with no ground floor residential areas and no gardens, then this certificate could remain valid.

In accordance with the requirements of the Monitor's Deed of Appointment, this RRWCC shall:

- Describe the remedial action which in the Monitor's professional opinion has been carried out for the purposes of completing the Redevelopment Remediation Works in relation to Phase 28; and
- Certify that in the Monitor's professional opinion the Redevelopment Remediation Works have been satisfactorily completed for Phase 28 in accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement, having regard to the Intended Use.

A copy of Schedule 8 of the Section 106 Agreement is provided in **Appendi B**.

Bac ground

Objectives of the Redevelopment Remediation Works

Part One of Schedule 8 of the Section 106 Agreement outlines the purpose and objectives of the Redevelopment Remediation Works as follows:

- The purpose and objectives of the Redevelopment Remediation Works are the carrying out of all such remedial action over and above that actually carried out as part of the RAP Works that is necessary in order to make each part of the Property suitable for its Intended Use. A part of the property will only be suitable for its Intended Use if and when the Phase Works Completion Date (PWCD) is declared in respect of that part of the Property.
- This objective will be deemed to be met for the purposes of the Section 106 Agreement and the RMA on the date specified in a notice from CDL declaring the PWCD for Phase 28. The PWCD will be declared once CDL is satisfied that the remediation necessary for the specified Intended Use for the Phase has been completed.

Part Two of Schedule 8 of the Section 106 Agreement places a number of obligations on SMD as the Developer. The main obligations pertinent to this Phase are as follows:

- The Developer shall carry out or procure the carrying out of all Remedial Action necessary in order to achieve the purpose and objective as outlined in Part 1 of Schedule 8 of the Section 106 Agreement. The design and specification of any remediation shall take account of the principles and objectives and the design assumptions for the RAP Works and shall not prejudice the achievement and future sustainability of these principles and objectives.
- In order to determine the need for Remedial Action in the first place it is necessary to undertake an appropriate site assessment. This assessment needs to take account of the site history, potential and/or actual measured extent of contamination and the associated

implied risk. Only by developing a thorough understanding of both potential and actual contamination will it be possible to confirm that all necessary Remedial Action likely to have been completed. This obligation should be satisfied through completion of an appropriate desk study and intrusive investigation.

- The RBSLs set out in Tables 1 and 2 [in Schedule 8 of the Section 106 Agreement] and the aesthetic criteria, remediation quality and scope (including the depth below Final Finished Level (FFL) to which quality standards are achieved), as the same may be varied in accordance with this Schedule 8, shall be achieved for each part of the Property at the minimum validation frequencies set out in Clause 8 of Part 3 (as applicable depending upon whether such part of the Property is intended for use as residential, commercial or recreational land) as a minimum base level standard.

It should be noted that SMD has procured the services of Atkins Limited to assist in discharging the above obligations.

Tables 1, 2, 3 and 4 from Schedule 8 of the Section 106 Agreement are reproduced below for reference.

Table Summary of Soil RBSLs

<i>Contaminant</i>	<i>Land-Use Specific Soil RBSL Surface to 1m below FFL (mg/kg)¹</i>			<i>Land-Use Specific RBSL Soil below 1m depth (mg/kg)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
<u>METALS & METALLOIDS</u>						
Arsenic	64	500	64	-	-	-
Cadmium	2.6	1400	2.6	-	-	-
Chromium	130	5000	200	-	-	-
Mercury	1	480	1	-	-	-
Nickel	50	5000	75	-	-	-
Selenium	3	8000	3	-	-	-
Lead	337	750	337	-	-	-
Vanadium	416	16000	640	-	-	-
Copper	200	-	200	-	-	-
Zinc	478	-	478	-	-	-
<u>ORGANIC SPECIES</u>						
Benzene	0.12	5	13	0.4	5	48
Benzo(a)pyrene ²	0.9	29	0.9	none	none	none
Toluene	36	1160	8110	52	389	none

<i>Contaminant</i>	<i>Land-Use Specific Soil RBSL Surface to 1m below FFL (mg/kg)¹</i>			<i>Land-Use Specific RBSL Soil below 1m depth (mg/kg)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
Ethylbenzene	41	122000	4740	140	none	none
Xylenes	32	121000	7940	58	none	none
1,2-Dichloroethane	0.04	2	4.5	0.1	0.65	6
Dichloromethane	5	1650	241	84	665	6220
Tetrachloroethene	11	1050	641	34	368	1780
Trichloroethene	1	84	193	2	28	269
Vinyl Chloride	0.01	4	0.7	0.04	1.6	16
1,2 Dichloroethene	4	273	632	7	91	881
1,1,1-Trichloroethane	154	577000	27900	160	3250	none
TPH Aromatic EC>C7-C8	125	1840	21337	146	617	none
TPH Aromatic EC>C8-C10	94	913	4025	257	547	none
TPH Aromatic EC>C10-C12	118	26515	4589	1394	none	none
TPH Aromatic EC>C12-C16	131	64875	4799	none	none	none
TPH Aromatic EC>C16-C21	82	51449	3639	none	none	none
TPH Aromatic EC>C21-C35	1130	51449	3639	none	none	none
TPH Aliphatic EC>C6-C8	8335	8517587	606191	none	none	none
TPH Aliphatic EC>C8-C10	112	158890	12075	158	none	none
TPH Aliphatic EC>C10-C12	3204	163360	12094	none	none	none
TPH Aliphatic EC>C12-C16	4513	169032	12117	none	none	none
TPH Aliphatic EC>C16-C21	94174	3429944	242573	none	none	none
TPH Aliphatic EC>C21-C35	94820	3429944	242573	none	none	none
Total TPH (Phase 1) ³	1717	81413	9061	9182	81956	None
Total TPH (Process Area) ³	2601	44344	10830	4098	35014	None
Total TPH (North Tank Farm) ³	1104	25875	9419	3802	13974	None
Total TPH (South Tank Farm) ²	1015	37230	6349	2792	34797	None
<u>ASBESTOS</u>						

<i>Contaminant</i>	<i>Land-Use Specific Soil RBSL Surface to 1m below FFL (mg/kg)¹</i>			<i>Land-Use Specific RBSL Soil below 1m depth (mg/kg)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
Sum of all Types of Asbestos Containing Material (ACM)	200	300	200	200 ⁴	-	-

Notes

- “-” value not applicable to scenario
- “none” RSBL value exceeds soil saturation limits and free phase assessment appropriate
- 1 Lower value of human health RBSL or Soil Code value if higher than background LCL value (applicable to metals & metalloids only)
- 2 Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach
- 3 ‘Total’ TPH RBSL derived for an area of development, based on individual RBSLs provided and available mass fraction TPH data in soil at time of derivation, using the inverse weighted average approach
- 4 Refer to Section 106 Agreement for specification of relevant depth ranges

Table Summary of RBSLs for groundwater

<i>Contaminant</i>	<i>Land-Use Specific RBSL (mg/l)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
TPH Aliphatic EC>C6-C8	none	none	none
TPH Aliphatic EC>C8-C10	none	none	none
TPH Aliphatic EC>C10-C12	none	none	none
TPH Aliphatic EC>C12-C16	none	none	none
TPH Aliphatic EC>C16-C21	none	none	none
TPH Aliphatic EC>C21-C35	none	none	none
TPH Aromatic EC>C7-C8	20	97	none
TPH Aromatic EC>C8-C10	22	none	none
TPH Aromatic EC>C10-C12	none	none	none
TPH Aromatic EC>C12-C16	none	none	none

Land-Use Specific RBSL (mg/l)

<i>Contaminant</i>	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
TPH Aromatic EC>C16-C21	none	none	none
TPH Aromatic EC>C21-C35	none	none	none
Benzene	0.7	6	198
Benzo(a)pyrene	none	none	none
Toluene	47	229	none
Ethylbenzene	102	506	none
Xylenes	43	607	none
1,2-Dichloroethane	0.2	0.82	45
Dichloromethane	150	624	none
Tetrachloroethene	22	115	none
Trichloroethene	2.6	13	813
Vinyl Chloride	0.06	0.3	18
1,2-Dichloroethene	15	68	none
1,1,1-Trichloroethane	193	989	none

otes

“none” theoretical RBSL greater than solubility limit

Table Scale of Aesthetic Criteria

<i>Class</i>	<i>Visual</i>	<i>Olfactory</i>
0	No visible staining of soil, no visible suspect ACM	No detectable odour on soil
1	Occasional staining of soil, no visible suspect ACM	Faint odour on soil
2	Frequent staining of soil	Distinct but not strong odour on soil
3	Occasional heavy staining of soil	Strong odour on soil
4	Heavy staining of soil	Strong odour discernible in ambient air
5	Visible hydrocarbon product	Overwhelming Odour

otes

Visible suspect ACM refers to asbestos containing material visible to the naked eye which a reasonable and prudent person used to managing asbestos may suspect to be asbestos containing.

Table Minimum Validation Testing Frequencies

<i>Testing for the Validation Suite at the following frequency:</i>	<i>Shallow Soils (Residential <1m FFL)</i>	<i>Deeper Soils (Residential >1m below FFL)</i>	<i>Soils (Commercial all relevant depths)</i>
Imported quarried material	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples
Imported soil from verified greenfield site	1 per 250m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples
Imported soil from characterised brownfield site ¹	1 per 25m ³ ex situ, composite of 5 sub-samples	1 per 50m ³ ex situ, composite of 5 sub-samples	1 per 100m ³ ex situ, composite of 5 sub-samples
0.5-1m below FFL in-situ	Regular grid of 1 per 50m ² , sample over 0.5m depth	n/a	Regular grid of 1 per 400m ² , sample over 0.5m depth
>1m below FFL in-situ	n/a	Regular grid of 1 per 100m ² , sample over 1m depth	Regular grid of 1 per 400m ² , sample over 0.5m depth
Stockpiled excavated site materials for re-use	1 per 50m ³ ex situ, composite of 5 sub-samples	1 per 100m ³ ex situ, composite of 5 sub-samples	1 per 400m ³ ex situ, composite of 5 sub-samples
Face of remedial excavations <1m deep	1 per 10m, minimum of 1 per face, worst case VO sample	n/a	1 per 15m, minimum of 1 per face, worst case VO sample
Face of remedial excavations >1m deep	n/a	1 per 10m ² , minimum of 1 per face, worst case VO sample	1 per 15m ² , minimum of 1 per face, worst case VO sample
Along redundant service excavations	1 per 20m of trench, worst case VO sample	1 per 20m of trench, worst case VO sample	1 per 20m of trench, worst case VO sample
Soil treated ex-situ and homogenised	1 per 200m ³ , composite of 5 regular sub-samples	1 per 200m ³ , composite of 5 regular sub-samples	1 per 500m ³ , composite of 5 regular sub-samples

Notes

“1” Validation suite to reflect prior use of the originating brownfield site and the design and purpose of the relevant area of Coed Darcy.

“VO” Visual/olfactory (i.e. aesthetic) observation

Remediation Action Plan (RAP) Works

In addition to meeting the requirements of the Redevelopment Remediation Works, the Developer must also complete a series of statutory remedial works which are referred to as

the RAP Works. The requirements for the RAP Works are outlined in Schedule 7 of the Section 106 Agreement.

It is intended that this report, which is the RRWCC, will be complemented by a RAP Works Completion Statement (RAPWCS) in order to provide the information required by CDL to enable the PWCD to be declared.

Details of the scope of works and associated validation that has been completed to satisfy the RAP requirements pertinent to this Phase are reported separately in RAPWCS ref. 49310747/BRRP00040/Cert 28a.

Information Sources

A summary of the information sources that the Monitor has been provided with in relation to Phase 28 is provided below in **Table** . Unless otherwise stated, the Monitor has relied solely on these information sources as the basis for issuing this RRWCC. Upon a review of the information sources, in the Monitor's reasonable professional opinion, such information and the manner in which it was obtained appears sufficiently up to date, reliable and robust to justify such reliance. No verification of the data has been completed by the Monitor unless noted in the following sections.

Electronic copies of the information sources are provided in **Appendi C**.

Table Information Sources

<i>Ref.</i>	<i>Document Reference</i>	<i>Format</i>	<i>Title</i>	<i>Author</i>	<i>Date</i>
1	44382742 / BRRP0001	Report	BP Llandarcy Refinery Desk Study	URS	05/07/07
2	5041216-REM-RPT-000216	Report	Derivation of Remediation Target Criteria Revision 3	Atkins	19/01/10
3	5041216-REM-RPT-476	Report	Derivation of Commercial Remediation Target Criteria	Atkins	01/01/11
4	5041216-PLOTS-RPT-626	Report	Geo-Environmental Assessment and Outline Remediation Strategy, Proposed Commercial Area	Atkins	19/12/11
5	5041216-REM-TN-577	Technical Note	Proposed Service Corridor (Road 5) Discussion of Ground Conditions and Remediation Proposals	Atkins	26/09/11
6	5041216-REM-RPT-375	Report	Commercial Area Controlled Waters Risk Assessment	Atkins	01/03/12
7	5041216-PLOTS-TN-838	Technical Note	Response to Monitor RFI101 - Review of Commercial Area Remediation Strategy	Atkins	01/10/12
8	5041216-ENG-TN-878	Technical Note	Proposed Construction Materials for Road 3 Embankment	Atkins	18/02/13
9	5041216-PLOTS-TN-907	Technical Note	Proposed Road 3 Embankment and Utilities Corridor Validation (Monitor Phase 28) Revision 1	Atkins	23/05/13
10	SLS/NW/2121	Letter	Declaration of Phase	SMD	02/04/13

<i>Ref.</i>	<i>Document Reference</i>	<i>Format</i>	<i>Title</i>	<i>Author</i>	<i>Date</i>
11	5041216-PLOTS-TN-945	Technical Note	Response to Monitor RFI111 & RFI112	Atkins	01/05/13
12	5041216-PLOTS-RPT-001016	Report	Commercial Area Validation report	Atkins	15/05/15

Requests for Information RFIs Issued by the Monitor

A number of RFIs have been raised by the Monitor in relation to Phase 28, a summary of which is provided in **Table** below. Copies of the RFIs are provided in **Appendix** . Copies of the responses received are included in the information sources listed in **Table** above, copies of which are provided in **Appendix C**.

Table RFIs

<i>RFI Ref.</i>	<i>Title</i>	<i>Associated Atkins Document</i>	<i>Date Raised</i>	<i>Complete</i>	<i>Comments</i>
82	Commercial Area Proposed Site Investigation	Technical Note 542 – Commercial Area Proposed Site Investigation	21/03/11	Yes	
101	Review of Atkins' Remediation Strategy for the Commercial Area	Atkins Report 626 - Geo-Environmental Assessment and Outline Remediation Strategy for the Proposed Commercial Area	07/03/12	Yes	Refer to Atkins' Technical Note 838
111	Review of Utilities Corridor Embankment Validation Technical Note	Technical Note 907 - Proposed Road 3 Embankment and Utilities Corridor Validation	16/04/13	Yes	Refer to Atkins' Technical Note 945
112	Review of Utilities Corridor Embankment Validation Technical Note	Technical Note 907 - Proposed Road 3 Embankment and Utilities Corridor Validation	26/04/13	Yes	Refer to Atkins' Technical Note 945
124	Review of Atkins' Commercial Area Validation Report	Atkins Report 1016 - Commercial Area Validation Report	02/12/14	Yes	Updated validation report received May 2015

DESCRIPTION OF REMEDIAL ACTION

The following section provides a description of the remedial action that has been carried out for the purpose of completing the Redevelopment Remediation Works in relation to Phase 28. This section of the report is structured as follows:

1. Site Assessment
2. Remediation Strategy

3. Redevelopment Remediation Works
4. Validation

Site Assessment

As discussed above, the Section 106 Agreement requires the Developer to undertake an appropriate site assessment which needs to take account of the site history, potential and/or actual measured extent of contamination and the associated implied risk. The Section 106 Agreement also states that only by developing a thorough understanding of both potential and actual contamination will it be possible to confirm that all necessary Remedial Action is likely to have been completed. This obligation should be satisfied through completion of an appropriate desk study and intrusive investigation.

Desk Study

It can be seen from the list of Information Sources provided in **Table** that Atkins has prepared a number reports and technical notes in relation to Phase 28. It is evident that Atkins has reviewed the information collected during previous site investigations and desk studies to develop an understanding of both potential and actual contamination. The following is of note:

With reference to the historical maps provided in **Appendix E**, Phase 28 was formerly occupied by a number of process areas, predominately associated with kerosene washing and the blending and loading of final products prior to dispatch. This is reported to have included:

- Lube oil storage, blending and dispatch plant and associated pump houses;
- Bulk loading area and associated railways and locomotive shed;
- Acid washers for cracked spirit and associated washeries and above ground storage tanks;
- Two electrical sub-stations;
- Kerosene extraction plants;
- Soda wash and caustic soda plant;
- Hypo and limewater pump house;
- Foam house; and
- Chemical store treatment area.

The former DiMe plant lies immediately to the west of Phase 28, where chlorinated solvents were used to remove waxy materials from the lube oil.

Intrusive Investigations

Details of the findings of intrusive investigations are summarised in Atkins' Geo-Environmental Assessment and Outline Remediation Strategy (Information Source 4). The Monitor is satisfied that sufficient intrusive investigations appear to have been completed in order for Atkins to develop an understanding of the site conditions prior to remediation. The following is of note:

Soils are reported to have comprised made ground of varying depths generally containing ash, clinker, gravels and concrete, underlain with natural ground comprising glacial silts, sands and gravels with bands of silty clays. A band of organic peaty alluvium and/or peat was also

encountered in some locations. Natural soils are underlain by pennant sandstone bedrock at varying depth.

Groundwater across Phase 28 is reported to have been encountered within all three strata (i.e. made ground, natural soils and bedrock), however is generally first encountered in soils.

Atkins also discusses the results from laboratory analysis of soil samples collected during the investigations in relation to the RBSLs specified in the Section 106 Agreement.

It should be noted that in addition to the RBSLs specified in the Section 106 Agreement, Atkins has also developed Remediation Target Concentrations (RTCs). The RTCs are intended to be health protective and it has been agreed previously with NPTCBC's Environmental Health Department that where the RTCs are numerically lower than the RBSLs, the RTCs shall be used. A summary of the RBSLs and RTCs is presented in **Appendi**.

Atkins reports a number of RTC/RBSL exceedances in soils for arsenic, lead, benzene, benzo(a)pyrene and 1,2 dichloroethane and one RTC/RBSL exceedance in groundwater for TPH. Asbestos was encountered in four locations. Free product was also encountered at a number of locations. Visual/olfactory evidence of contamination was recorded in a number of trial pits across the commercial area, up to a maximum score of five for both visual and olfactory evidence as defined in **Table** in this report.

Atkins also undertook an assessment of ground gases which is discussed further in Section 3.2.1 of this report.

Remediation Strategy

Schedule 8 of the Section 106 Agreement sets out the minimum remedial action required depending on the Intended Use and the groundwater regime. As discussed above groundwater in Phase 28 is primarily in soil, i.e. there is sufficient soil material over bedrock to commonly contain perched groundwater such that the water table is normally first encountered in soil. As the Intended Use has been declared as commercial, the minimum remedial action required for commercial end-use where groundwater is in soil has been applied. With reference to Schedule 8 of the Section 106 Agreement, the following minimum requirements are specified:

- The RBSLs and the aesthetic criteria, remediation quality and scope (including the depth below FFL to which quality standards are achieved) shall be achieved for each part of the Property at the minimum validation frequencies set out in Clause 8 of Part 3 of the Section 106 Agreement (as applicable depending upon whether such part of the Property is intended for use as residential, commercial or recreational land) as a minimum base level standard.
- All oil saturated soils and soil containing free product other than minor sheens shall be removed to a minimum depth of 2m below FFL or 0.5m below the likely lowest seasonal groundwater elevation following development of the intended Urban Village, whichever is the deeper. This depth is to be established by consideration of all available groundwater level monitoring data.
- All soils must meet the RBSL for TPH to at least 1m below FFL.
- All soils must meet in bulk, considering both dispersed fibres and pieces of ACM, the RBSL for ACM to at least 1m below FFL and any visible ACM encountered during construction in the first 1m below FFL is to be removed.
- Where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring. Such measures could include the installation of interception trenches and

management of discharge from those. The Developer shall monitor whatever measures are put in place after their installation to continue to demonstrate their effectiveness.

- Where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.

Furthermore, Schedule 10 of the Section 106 Agreement sets out additional generic remedial requirements, the following of which are relevant to Phase 28:

- Irrespective of the Intended Use of each Phase or part thereof, all existing buried services at the Property shall be removed and the routes of those services shall be backfilled with material no more permeable than the general material in the vicinity. Where backfill to new underground services may become a pathway for residential Pre-Transfer Date Contamination, appropriate control measures such as land drainage or venting measures shall be installed so as to appropriately protect remediated and/or developed areas
- Wherever there is a risk that following construction of the Urban Village groundwater or organic phase liquid may contaminate soils within the top one metre below FFL such that any of the relevant RBSLs and/or aesthetic criteria specified in Schedule 8 may be exceeded, the Developer shall ensure that all necessary steps are taken to mitigate these risks. Suitable measures may include, but not be limited to, the installation of land drains and/or the raising of the site ground levels such that groundwater will not be able to influence shallow soil quality.
- To provide a minimum thickness of suitable garden soils in residential areas, soils for landscaping in public and commercial areas and sub-base for hardsurfaced areas, the Developer shall build up the final elevation after completion of the RAP and Redevelopment Remediation Works with a minimum of 0.5m of quality controlled imported fill materials suitable for the use to which they are to be put and of better quality than all RBSLs for the relevant end-use and meeting aesthetic type 0 for residential use and type 1 or better for commercial use as specified in Schedule 8 of the Section 106 Agreement. For the avoidance of doubt, the minimum remediation standards set out above therefore assume that the first half metre below FFL will comprise such imported material in all circumstances of residential and commercial end-use.

Based on the above requirements, and the data collected during the site investigations, Atkins' Remediation Strategy (Information Sources 4 and 5) recommended the following scope of redevelopment remediation works for Phase 28:

- Soil turnover to a minimum depth of 2m bgl;
- Removal of all oil saturated soils and/or free product and the removal of all soils with a visual/olfactory score of five;
- Removal of identified 'hotspots' of increased contamination;
- Further investigation and removal of all identified asbestos contaminated soils;
- Removal of structural remnants, including concrete, brickwork and other identified obstructions;
- Removal of services, including drainage;
- Removal of redundant pipework.

The Monitor was satisfied that the proposed Redevelopment Remediation Works, as outlined above, would achieve the requirements of the Section 106 Agreement.

Redevelopment Remediation works

The redevelopment remediation works that have been completed for Phase 28 are described in Atkins' Validation Report (Information Source 12). The works were carried out in three phases over a number of years and are reported to have been completed in September 2013.

The extent of the three phases is illustrated on drawing 5041216-REM-DWG-1611 Rev A, a copy of which is provided in Atkins' Validation Report (Information Source 12). An extract from the drawing is presented in **Figure** for reference.

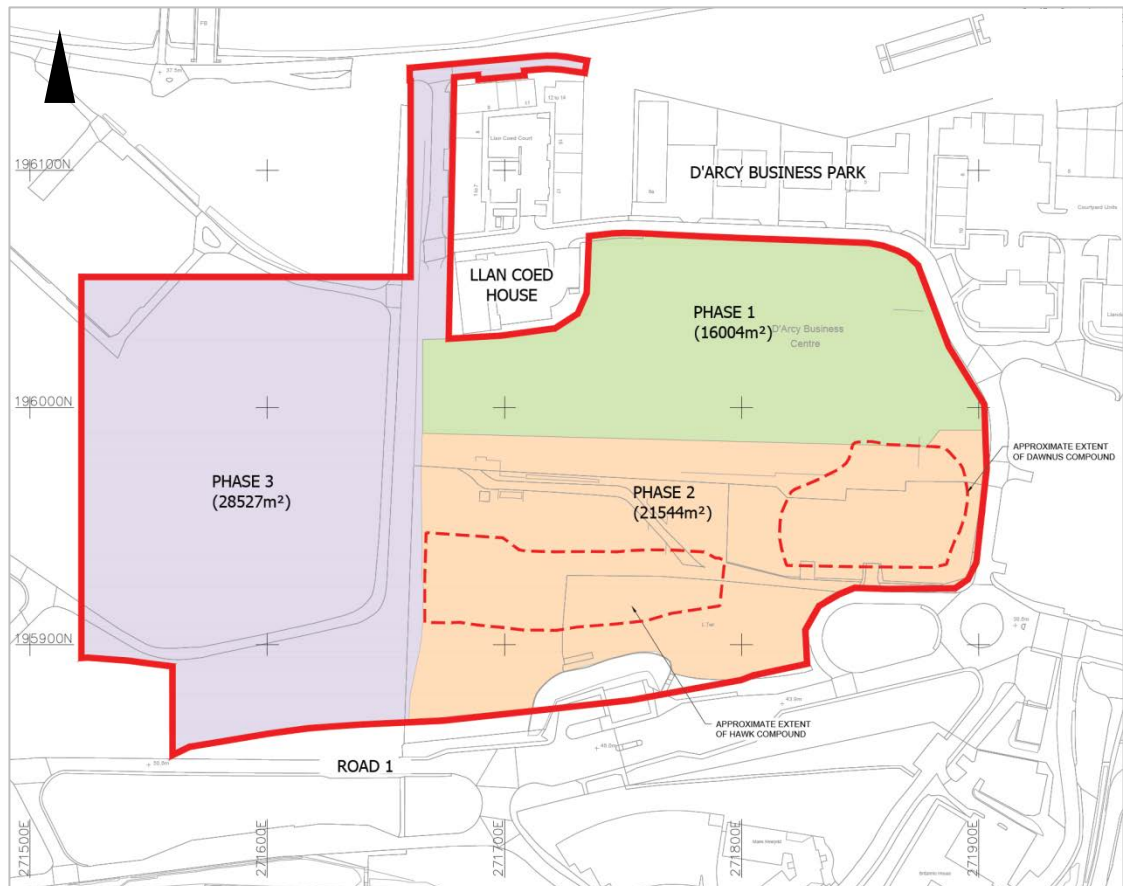


Figure **Timing of the remediation works**

The remediation works that have been completed for each of the phases is summarised below.

Phase 1

The area covered by Phase 1 was remediated by the contracting firm Churngold in 2007 prior to the sale of the Llandarcy site to SMD. These works involved a site investigation, followed by the removal of hydrocarbon impacted soils and asbestos hotspots. Where contamination was identified, soils were remediated to a maximum depth of 2m bgl. On completion of the works Churngold excavated a series of validation trial pitting on a 20m x 20m grid. Where contamination exceeding the agreed thresholds was identified, the material was removed and additional validation samples were collected from the sides and base of the resultant excavation.

Based on the works undertaken by Churngold, Atkins' remediation strategy therefore recognised the potential for contamination to exist at depths below 2m bgl.

In order to protect against the recontamination of the remediated area, Churngold installed a filter drain around the perimeter of Phase 1. The filter drain was installed at sufficient depth to intercept shallow groundwater and prevent potentially contaminated groundwater migrating north towards the remediated area.

Atkins subsequently carried out a further site investigation across Phase 1 and identified structural remnants and pipework which were removed, along with hydrocarbon impacted soils where encountered. The filter drain that had previously been installed by Churngold was also removed along the boundary of Phases 1 and 2.

The soils were then validated in accordance with the requirements of the Section 106 Agreement.

Phase 2

Atkins reports that the remediation works within Phase 2 involved the turnover of soils to a minimum depth of 2m bgl. Excavations were terminated on the underlying natural soils, which were generally encountered at relatively shallow depth.

Hydrocarbon impacted made ground was encountered across Phase 2, which was removed. A number of structural foundations and services were also removed.

On completion, a series of validation trial pits were excavated to demonstrate compliance with the requirements of the Section 106 Agreement.

Phase 3

The remediation works within Phase 3 involved the turnover of made ground down to the underlying natural soils. Soils were segregated at source based on a visual/olfactory assessment, with free product and oil-saturated soils being removed for treatment elsewhere on site.

A number of concrete slabs and structural foundations were encountered which were removed. A number of pipelines were also encountered which were removed.

The excavations were backfilled using various sources of fill, including excavated materials that were deemed to be acceptable based on the visual/olfactory assessment, as well as soils imported from elsewhere on site.

Following the completion of the works a series of validation trial pits were excavated to demonstrate compliance with the requirements of the Section 106 Agreement. Where hotspots were identified, further materials were removed and the excavations validated.

The works also involved the construction of a road embankment using stabilised/solidified sludge recovered from North Site Reservoir.

The Monitor's Observations During the Redevelopment Remediation Works

A summary of the Monitor's observations during the Redevelopment Remediation Works is provided in **Table** .

Table onitor s Observations uring the or s

<i>Date</i>	<i>Observations</i>
01/03/12	Works have started on the second phase to remove the hardstanding from the upper plateau near the site entrance at the southern end of Phase 28.
08/03/12	Works are continuing to remove the hardstanding to expose the underlying soils.
13/03/12	Works beginning to turn over the soils situated beneath the hardstanding.
23/03/12	Soil turnover continuing.
02/04/12	Soil turnover continuing and soils are being segregated at source based on a visual/olfactory assessment.
16/04/12	Soil turnover continuing. A number of pipelines have been encountered which are being removed. A temporary compound is being created for the contractor.
25/04/12	Soil turnover works within the second phase appear to be generally complete.
09/05/12	Validation trial pits and further soil segregation is taking place.
15/05/12	An excavation was observed at the western end of the first phase near Llan Coed House adjacent to an area which had reportedly been remediated previously. Heavily impacted soils and free product was observed within the excavation. Impacted soils are being removed and the excavation is being extended to delineate the extent of the contamination.
04/10/12	Works have recommenced within the third phase at the western boundary of the commercial area adjacent to the DiMe. Excavated materials are being stockpiled to the northwest of Llan Coed House.
24/10/12	The third phase, between Llan Coed House and the DiMe, was walked over and heavily contaminated soils, free product, sheens and ochreous seepages were observed. Areas of slag were also being excavated and removed. Oils saturated soils are being removed and several pipes are reported to have been removed. A number of concrete structures are being removed and it was noted that significant volumes of free product was situated directly beneath the concrete slabs. A layer of clay is present at depth which does not appear to have been impacted. Thin lenses of peat are also present in some locations. It was reported that these do not appear to be impacted. There was strong olfactory evidence of contamination and odour suppression equipment being used adjacent to Llan Coed House.
01/11/12	Works are continuing within the third phase with a number of large excavations in progress. Free product was observed across the area and some DNAPL was reported. Pipelines have also been encountered and are being removed. Earthing rods have been encountered, which could potentially have been associated with a former sub-station. It was suggested that soil samples should be tested for PCBs. Clay and peat is being encountered at the base of the remedial excavations. Proposals for the backfilling were discussed with Atkins and a stockpile of potential fill material was examined. It was agreed that testing of soil samples from the stockpile would be required to confirm its suitability in accordance with the Section 106 Agreement.
13/11/12	Works are continuing and backfilling has started on some of the deeper excavations in the south-eastern area of the third phase. The excavations have been partially backfilled using the soils from the stockpile inspected previously. Atkins report that soil samples have been collected from the stockpile to confirm suitability. Atkins also reports that elsewhere pipelines have been removed including some with concrete surrounds. General breakout of concrete etc. ongoing.

Date	Observations
20/11/12	Soil turnover works have progressed into the low lying area to the southwest of Llan Coed House where significant contamination has been observed. Atkins reports that Hydrock will shortly begin a trial for laying the embankment material using stabilised/solidified sludge from North Site Reservoir.
21/11/12	Works are continuing at the south western corner of the third phase which has been partially backfilled. Some areas of clay remain visible at the base of the excavation and appear not to have been impacted. Works have also progressed northwards and eastwards where a concrete slab has been broken out. This was found to be underlain with another concrete slab with heavy contamination sandwiched between. Soils beneath the second slab are reported to have been acceptable. The extremely heavy rain has resulted in run-off and groundwater seepages which have mobilised significant sheens. These appear to have been generated from the area to the west (i.e. the edge of the DiMe) into which the remediation excavation will need to be extended. Some surface water is passing through a mobile oil/water separator before discharging to the API separators and the consented discharge. Other run-off is discharging directly to the API separators. It was agreed that booms etc. were required to manage the sheens.
13/12/12	Excavations are continuing within the third phase, with natural soils being exposed at the base of the excavation (usually observed as clay or sometimes peat). The arisings are being segregated at source based on a visual/olfactory assessment and heavily contaminated soils are being removed for treatment. Some of the remaining soils were observed to have occasional staining with significant odours (i.e. visual/olfactory scores of 3/4). A concrete slab adjacent to Llan Coed House has been removed and the excavation is being backfilled using stockpiled material from which soil samples have been taken. Atkins reports that the samples contained a high lead content but this was considered acceptable given that these materials shall be at significant depth in the final development. Structures and pipework continue to be removed and it was noted that some pipework had been laid within the natural clay, making it difficult to identify in situ as there is no visible evidence of a trench having been backfilled.
10/01/13	Works are continuing to remove structures and pipework.
30/01/13	Several buried structures have been removed and the breakout of a concrete slab is largely complete. A layer of heavily contaminated soils was reported to have been present directly beneath the slab. Pipework that had been removed was examined and it was noted that they contained an oily sludge. Management of surface water run-off is hampering operations due to heavy rain and snow.
07/02/13	Works are progressing southwards, adjacent to Llan Coed House. Works have also progressed westwards into the DiMe. Atkins reports that generally areas of contamination have been associated with pipe routes. Some of the reinstated soils were observed to have staining but were considered to be generally acceptable for commercial end-use.
19/02/13	The remediation excavation has been substantially completed within footprint of the proposed embankment. No further significant contamination was reported other than associated with pipe routes. A deep chamber has been uncovered to the northwest of Llan Coed House.
28/02/13	The majority of the commercial area has been turned over and backfilled. Some ochreous seepages and metallic sheens were noted. One deep structure to the northwest of Llan Coed House is yet to be removed and will be investigated further.
14/03/13	The works are largely complete but some remaining areas are restricted by the haul roads. It was suggested that a series of trial pits either side of the roads should be excavated to identify any areas of concern.

<i>Date</i>	<i>Observations</i>
25/03/13	The remediation works appear to be substantially complete and backfilling operations are largely complete. Part of a drainage ditch and some spring lines have been backfilled with crushed rock in preparation for the placement of fill materials for the proposed road embankment.
04/04/13	Construction of the embankment has commenced. Two excavations have been opened to remove hotspots that were identified during the validation exercise.
17/04/13	Works have recommenced within the first phase directly to the south of Llan Coed House. Pipelines and hydrocarbon impacted soils are being removed. It was noted that some of the pipelines appear to continue beneath the car part for Llan Coed House.
10/07/13	Works are continuing on the construction of the road embankment using stabilised/solidified sludge from North Site Reservoir.
21/11/13	An excavation to remove a hotspot that had been identified adjacent to the new road embankment was observed.
04/12/13	Works within the south east corner of Phase 28, which will become the green square, were observed. A relatively shallow excavation has been undertaken but there was no significant evidence of contamination. This area will be backfilled with imported subsoil and topsoil in preparation for landscaping.

A selection of photographs are provided in **Appendix F**.

Based on the site observations, the Monitor is satisfied that the works appear to have been carried out in accordance with the Remediation Strategy and the requirements of the Section 106 Agreement.

Validation

With reference to the remediation requirements discussed in Section 2.2 of this report, the following sections aim to demonstrate whether or not the requirements of the Section 106 Agreement have been achieved. It should be noted that in the absence of a detailed development layout and confirmed FFLs, it has been assumed that the ground level following the completion of the redevelopment remediation works represents FFL minus 0.5m.

Aesthetic Criteria and the Removal of Oil Saturated Soils

The Section 106 Agreement requires that for a Commercial Phase all oil saturated soils and soil containing free product other than minor sheens shall be removed to a minimum depth of 2m below FFL or 0.5m below the likely lowest seasonal groundwater elevation, whichever is the deeper.

As discussed in Section 2.3, the redevelopment remediation works undertaken across Phase 28 involved the excavation of soils down to 2m bgl or until the underlying natural soils were encountered. Atkins reports that groundwater was typically encountered at depths of 2 to 3m bgl at the interface between made ground and natural soils. Given that the turnover of soils extended into the underlying natural soils, beyond groundwater where encountered, the requirement to remediate the soils to a minimum depth of 2m below FFL or 0.5m below the lowest likely seasonal groundwater elevation is considered to have been satisfied.

During the works the soils were segregated on the basis of a visual/olfactory assessment in accordance with the scale of aesthetic criteria presented in **Table 1** in this report. Oil saturated soils and soil containing free product were removed for treatment elsewhere on site.

The Monitor's observations indicated that the soils were being segregated appropriately and Atkins reports that approximately 15,000m³ of unacceptable oil saturated or solvent impacted material was removed from Phase 28.

Atkins' validation trial pit logs (Information Source 12) appear to confirm the absence of oil saturated soils and soil containing free product within Phase 28. This is also consistent with the Monitor's observations during the works.

It is noted however that a number of haul roads which pass through Phase 28 remain in situ and the underlying soils have not been validated because the haul roads remain operational. As noted in **Table** it was suggested that a series of trial pits should be excavated either side of the haul roads to identify any areas of concern. This was completed, but it is noted that the trial pit log for CAV044 indicates the presence of free product which may extend below the haul road and therefore may not have removed in its entirety.

Whilst there remains a risk that residual free product may still be present beneath the haul roads, the Monitor is satisfied that given the depth below FFL and given the likely small volumes of free product remaining, it is considered unlikely that this would pose a significant risk to the final development. Nevertheless, should the proposed FFLs change significantly then it may be necessary to carry out further remediation in these areas.

In summary, the Monitor is satisfied that oil saturated soils and soil containing free product appear to have been removed from Phase 28 for the depths below FFL specified in the Section 106 Agreement.

RBSLs

Soil RBSLs

The Section 106 Agreement requires that all soils must meet the specified RBSLs at the specified depths and in particular the RBSL for TPH to at least 1m below FFL. As noted in Section 2.1.2 of this report, in addition to the RBSLs specified in the Section 106 Agreement, soil samples have also been tested against the RTCs developed by Atkins.

Table in this report sets out the minimum validation testing frequencies as specified in the Section 106 Agreement. The following testing frequencies are relevant to Phase 28:

- In situ soils are to be tested on a regular grid at a minimum frequency of 1 sample per 400m², irrespective of the depth below FFL;
- Stockpiled excavated site materials proposed for re-use are to be tested at a minimum frequency of 1 sample per 400m³ of material; and
- Soil treated ex-situ and homogenised are to be tested at a minimum frequency of 1 sample per 500m³ of material.

The following sections describe the testing that has been undertaken on the soils within Phase 28.

In Situ Soils

Atkins reports that during the soil turnover described in Section 2.3 of this report, a total of 96 soil samples were collected from the base of the excavations. Following this, the excavations were backfilled and Atkins then undertook a programme of validation trial pitting across Phase 28. Soil samples were collected from 137 trial pits.

Given that Phase 28 covers an area of 66,000m², the excavation of 137 trial pits equates to a testing frequency of 1 sample location per 482m². Whilst this does not meet the minimum testing frequency specified in the Section 106 Agreement of 1 sample per 400m², if the base

samples are included then the overall sampling frequency meets the requirements. Furthermore it should be noted that in general more than one soil sample was collected from each trial pit. Therefore the Monitor is satisfied that a sufficient number of soil samples have been tested.

With reference to Atkins' drawing 5041216-REM-DWG-0001610 Rev A, a copy of which is provided in Atkins' validation report (Information Source 12), the Monitor is also satisfied that the samples appear to have been collected across a reasonably regular grid.

Testing of the in situ soil samples identified 27 hotspots with RBSL/RTC exceedances. Seven of these hotspots are reported to have been removed and replaced with acceptable material. The remaining 20 hotspots are reported to have been located at depth and we re-screened against the RBSL/RTCs for deep soils and found to be acceptable.

Having reviewed the test results, the Monitor is satisfied that the results have been interpreted appropriately. However it should be noted that if the development layout and proposed FFLs differ significantly from the assumed FFLs, then some of these hotspots may need to be remediated.

Imported Soils

Atkins reports that imported soils were used in five locations across Phase 28 as summarised in **Table** .

Table Summary of Imported Soils

<i>Description</i>	<i>Volume of Imported Soil</i>	<i>Required Testing Frequency</i>	<i>Number of Samples</i>	<i>Testing Frequency Achieved</i>
Hawk compound	6,960m ³	1 per 400m ³	28	1 per 249m ³
Dawnus compound	5,075m ³	1 per 400m ³	21	1 per 242m ³
Granular material / slag	2,500m ³	1 per 400m ³	8	1 per 313m ³
North Site Reservoir stabilised/solidified material	6,500m ³	1 per 500m ³	13	1 per 500m ³
Capping	6,500m ³	1 per 400m ³	19	1 per 342m ³

It can be seen that the minimum testing frequencies specified in the Section 106 Agreement were achieved for all imported soils.

Testing of the imported soils identified 10 hotspots which were subsequently removed as described in Appendix F of Atkins' validation report (Information Source 12). Re-sampling indicated that the soils met the RBSL/RTC requirements.

The Monitor is therefore satisfied that the imported soils have been tested appropriately and meet the chemical quality requirements specified in the Section 106 Agreement.

Groundwater RBSLs

In addition to the RBSLs for soils, the Section 106 Agreement also specifies RBSLs for groundwater as detailed in **Table** in this report.

Atkins reports that groundwater samples were been collected from a total of 32 sample locations both prior to and following the completion of the redevelopment remediation works. It is noted that not all locations were sampled after the remediation works, but it is assumed that this is because some of the pre-existing groundwater monitoring wells were lost during the remediation works. It is also noted that some of the sample locations are situated outside of Phase 28. However, given that these sample locations are generally situated down gradient of Phase 28, the Monitor is satisfied that the results are still relevant.

Atkins reports that 33 groundwater samples were obtained in 2011 prior to the redevelopment remediation works and a further 17 groundwater samples were obtained in 2013, reportedly after the completion of the remediation works.

The samples were screened against the RBSLs/RTCs and no exceedances were identified in either the pre-remediation or post-remediation samples.

In summary the Monitor is satisfied that the groundwater within Phase 28 appears to be in accordance with the RBSLs specified in the Section 106 Agreement.

Measures to Prevent Contamination Migration

The Section 106 Agreement states that where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring.

The areas immediately adjacent to and up gradient of Phase 28 have been remediated in line with the requirements of the Section 106 Agreement and therefore are not considered to pose a risk to Phase 28 in terms of recontamination. Furthermore, given the scope of the remediation works that have been completed within Phase 28, whereby free product and oil saturated soils have been removed, the recontamination of down gradient areas is considered unlikely. Therefore measures to prevent the migration of contamination are not considered necessary for Phase 28.

In summary the Monitor is satisfied that there is minimal risk of migration in ground of hazardous gas or contaminated liquid into Phase 28 and therefore no measures are considered necessary in order to prevent the recontamination of Phase 28.

Asbestos

The Section 106 Agreement requires that all soils must meet in bulk, considering both dispersed fibres and pieces of ACM, the RBSL for ACM to at least 1m below FFL and that any visible ACM encountered during construction in the first 1m below FFL is to be removed.

Atkins' validation report (Information Source 12) indicates that soil samples received a routine asbestos screening and that some samples returned positive results. Subsequent quantified analysis was then undertaken on a selection of these samples that had returned positive results.

Seven asbestos hotspots were identified and Atkins reports that the soils were removed and replaced with suitable backfill material. Subsequent validation of the hotspots indicated that some RBSL exceedances remained. However, these were generally at depths greater than 1m bgl and were therefore considered to be acceptable in respect of the requirements of the Section 106 Agreement.

In summary, whilst the Monitor has some concern that asbestos appears to be present within the soils across Phase 28, it is recognised that the quantities are not always in excess of the RBSL, or that the exceedances are located at depths greater than 1m bgl and are therefore acceptable in accordance with the Section 106 Agreement. Nevertheless it is suggested that the presence of asbestos should be taken into consideration when carrying out construction works within Phase 28 and appropriate safe systems of work should be adopted.

Seepages

The Section 106 Agreement states that where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour.

A number of seepages were observed during the works, some of which had hydrocarbon sheens and ochreous colouration. However, following the completion of the redevelopment remediation works, the presence of hydrocarbon sheens generally ceased to be observed, albeit a number of ochreous sheens continued to be observed in the southwest part of Phase 28 where groundwater was observed to discharge from bedrock.

Atkins' Technical Note 945 (Information Source 11) states that these seepages will be collected in the drainage system for the new embankment which will discharge offsite via a consented discharge point. Atkins does not currently envisage there being any open ditches to convey surface water drainage and therefore any ongoing ochreous impact should not be visible.

In summary the Monitor is satisfied that seepages will be appropriately managed in relation to Phase 28.

Removal of Buried Services

The Section 106 Agreement states that irrespective of the intended use, all existing buried services shall be removed.

As discussed above, the redevelopment remediation works undertaken across Phase 28 involved the excavation of in situ soils down to the underlying natural soils. Buried services that were encountered during the works were removed. This generally comprised pipelines, some of which were found to contain residual product, which was collected and removed.

Atkins reports that a number of pipelines were found to have been laid within the underlying natural clay, making it difficult to identify the presence of pipework as there was no visible evidence of a trench having been backfilled. A number of trial pits were therefore excavated into the clay to verify the absence of pipework.

In summary, the Monitor is satisfied that buried services have been removed from Phase 28.

Groundwater

The Section 106 Agreement states that wherever there is a risk that following construction of the Urban Village groundwater or organic phase liquid may contaminate soils within the top 1m below FFL such that any of the relevant RBSLs and/or aesthetic criteria may be exceeded, then all necessary steps should be taken to mitigate these risks. This may involve the installation of land drains and/or the raising of the site ground levels.

Observations during the works indicate groundwater levels to be significantly below the FFL and therefore the risk of recontamination of the top 1m of soils is considered unlikely. As such, the Monitor is satisfied that the installation of land drains and/or the raising of the site ground levels is not necessary in relation to Phase 28.

Fill to Achieve FFL

The Section 106 Agreement requires that the build up of the final elevation after completion of the Redevelopment Remediation Works must comprise a minimum of 0.5m of quality controlled imported fill materials suitable for the use to which they are to be put and of better quality than all RBSLs for the relevant end-use and meeting aesthetic type 1 or better for commercial use.

Atkins' validation report (Information Source 12) states that the post-remediation ground levels generally represent FFL minus 0.5m and that the top 0.5m of quality controlled imported fill materials are yet to be placed. As such this requirement is yet to be met.

A record of the as-built levels following the completion of the remediation works is shown on Atkins' drawing 5041216-REM-DWG-1632, a copy of which is provided in Atkins' validation report (Information Source 12).

It should be noted that any subsequent import of material and/or removal of material from the development phase following certification will need to be controlled by the Local Planning Authority as the Monitor will have no formal on-going role to control subsequent works once the RRWCC is issued.

It should also be noted that if there is any significant change in the development proposals or the proposed FFLs then reconsideration of the information contained within this report may be necessary. Notwithstanding this, it is understood that the redevelopment remediation works that have been completed are aimed at being conservative to allow for minor alterations to FFLs.

CERTIFICATION

Redevelopment Remediation Works

The following section aims to confirm whether or not in the Monitor's professional opinion the Redevelopment Remediation Works have been satisfactorily completed in accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement, having regard to the Intended Use, which has been declared as commercial.

With reference to the minimum remedial action required for commercial end-use where groundwater is in soil as listed in Section 2.2 of this report, **Table 1** provides a summary of whether or not in the Monitor's professional opinion these objectives have been satisfied.

Table 1 Certificate Summary

REQUIREMENT	STATUS	COMMENTS
The RBSLs and the aesthetic criteria, remediation quality and scope (including the depth below FFL to which quality standards are achieved) shall be achieved for each part of the Property at the minimum validation frequencies set out in Clause 8 of Part 3 of the Section 106 Agreement (as applicable depending upon whether such part of the Property is intended for use as residential, commercial or recreational land) as a minimum base level standard.	Complete	Refer to Section 2.4 of this report.

REQUIREMENT	STATUS	COMMENTS
All oil saturated soils and soil containing free product other than minor sheens shall be removed to a minimum depth of 2m below FFL or 0.5m below the likely lowest seasonal groundwater elevation following development of the intended Urban Village, whichever is the deeper. This depth is to be established by consideration of all available groundwater level monitoring data.	Complete	Refer to Section 2.4.1 of this report.
All soils must meet the RBSL for TPH to at least 1m below FFL.	Complete	Refer to Section 2.4.2 of this report.
Where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring. Such measures could include the installation of interception trenches and management of discharge from those. The Developer shall monitor whatever measures are put in place after their installation to continue to demonstrate their effectiveness.	Complete	Refer to Section 2.4.3 of this report.
All soils must meet in bulk, considering both dispersed fibres and pieces of ACM, the RBSL for ACM to at least 1m below FFL and any visible ACM encountered during construction in the first 1m below FFL is to be removed.	Complete	Refer to Section 2.4.4 of this report.
Where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.	Complete	Refer to Section 2.4.5 of this report.
Irrespective of the Intended Use of each Phase or part thereof, all existing buried services at the Property shall be removed and the routes of those services shall be backfilled with material no more permeable than the general material in the vicinity. Where backfill to new underground services may become a pathway for residential Pre-Transfer Date Contamination, appropriate control measures such as land drainage or venting measures shall be installed so as to appropriately protect remediated and/or developed areas.	Complete	Refer to Section 2.4.6 of this report.

REQUIREMENT	STATUS	COMMENTS
Wherever there is a risk that following construction of the Urban Village groundwater or organic phase liquid may contaminate soils within the top one metre below FFL such that any of the relevant RBSLs and/or aesthetic criteria specified in Schedule 8 may be exceeded, the Developer shall ensure that all necessary steps are taken to mitigate these risks. Suitable measures may include, but not be limited to, the installation of land drains and/or the raising of the site ground levels such that groundwater will not be able to influence shallow soil quality.	Complete	Refer to Section 2.4.7 of this report.
To provide a minimum thickness of suitable garden soils in residential areas, soils for landscaping in public and commercial areas and sub-base for hardsurfaced areas, the Developer shall build up the final elevation after completion of the RAP and Redevelopment Remediation Works with a minimum of 0.5m of quality controlled imported fill materials suitable for the use to which they are to be put and of better quality than all RBSLs for the relevant end-use and meeting aesthetic type 0 for residential use and type 1 or better for commercial use as specified in Schedule 8 of the Section 106 Agreement. For the avoidance of doubt, the minimum remediation standards set out above therefore assume that the first half metre below FFL will comprise such imported material in all circumstances of residential and commercial end-use.	N/A	Refer to Section 2.4.8 of this report.

Preventative Measures

In addition to preparing the RAPWCS and RRWCC, the Monitor is also obliged, if requested by CDL, to review any certificate or other documentation produced to CDL by or on behalf of the Developer purporting to confirm that Preventative Measures have been completed or are not required in relation to any Phase or part thereof providing CDL in writing of its professional opinion as to:

- whether the author is suitably qualified to issue the certificate; and
- whether the certificate contains or reflects any manifest error, omission or bias, etc. and certifies that the land is fit for its purpose.

The Monitor has not received any such documentation or requests in relation to Phase 28.

Ground Gas

The Section 106 Agreement states that a proprietary and appropriate ground gas resistant membrane and appropriate venting system shall be installed in all structures that will be entered by people and any structure where there is a potential for gas accumulation if ground gas is present.

Atkins reports that they have undertaken a ground gas assessment which concluded that the risk is considered representative of Characteristic Situation 2 (low risk classification) as defined in CIRIA C665.

Atkins' validation report (Information Source 12) suggests that the following gas and vapour protection measures will be required for all enclosed structures:

- Reinforced concrete cast in situ floor slab (suspended, non suspended or raft) with at least 1200g DPM;
- Beam and block or pre-cast concrete and minimum 2000g DPM/reinforced gas membrane;
- Possibly underfloor venting or pressurisation in combination with either or the above options, depending on use;
- All joints and penetrations to be sealed.

The exact details of the gas protection systems will need to be agreed with the relevant regulatory authorities prior to installation.

The Monitor has not received any requests from CDL to review any certificate or other documentation purporting to confirm that Preventative Measures have been completed or are not required.

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This RRWCC confirms that in the Monitor's professional opinion, and on the basis of the information provided within the Information Sources and observations made by the Monitor during the remediation works, the Monitor is satisfied that the Phase 28 redevelopment remediation works appear to have been completed in general accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement, having regard to the specified Intended Uses, and that the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement are likely to continue to be met for the foreseeable future without the need for further remedial action in relation to or affecting the area within the Phase Boundary.

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The PWCD will be declared once CDL is satisfied that the remediation necessary for the specified Intended Use for the Phase has been completed. This report, which is the RRWCC, will be complemented by a RAPWCS in order to provide the information required by CDL to enable the PWCD to be declared.

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ST. MODWEN DEVELOPMENTS LIMITED - a ST. MODWEN company

Registration England 892832

Sir Stanley Clarke House, 7 Ridgeway, Quinton Business Park, Birmingham, B32 1AF

T: 0121 222 9400 **W:** www.stmodwen.co.uk

02nd September 2014

Our ref:

Coed Darcy Limited
Dumfries House
Dumfries Place
Cardiff
CF10 3ZF

Dear Sirs

Coed Darcy
Phase 28 - Proposed Commercial Area
Request for Phase Works Completion Date

We hereby give our written request seeking the declaration of the Phase Works Completion Date for Phase 28 of Coed Darcy as required under Clause 4.6 of the Remediation Agreement made between Coed Darcy Limited, St. Modwen Developments Limited and St. Modwen Properties PLC dated 23rd May 2008.

The Phase 28 boundary is shown on the attached Drawing No. 5041216-REM-DWG-1608.

The "Intended Use" for Phase 28 is confirmed as that of a proposed commercial area, including roads, with associated embankments and utilities installation.

As required by the Remediation Agreement, we have copied this letter to the Monitor.

Yours faithfully

Neil Williams

For and on behalf of St. Modwen Developments Limited

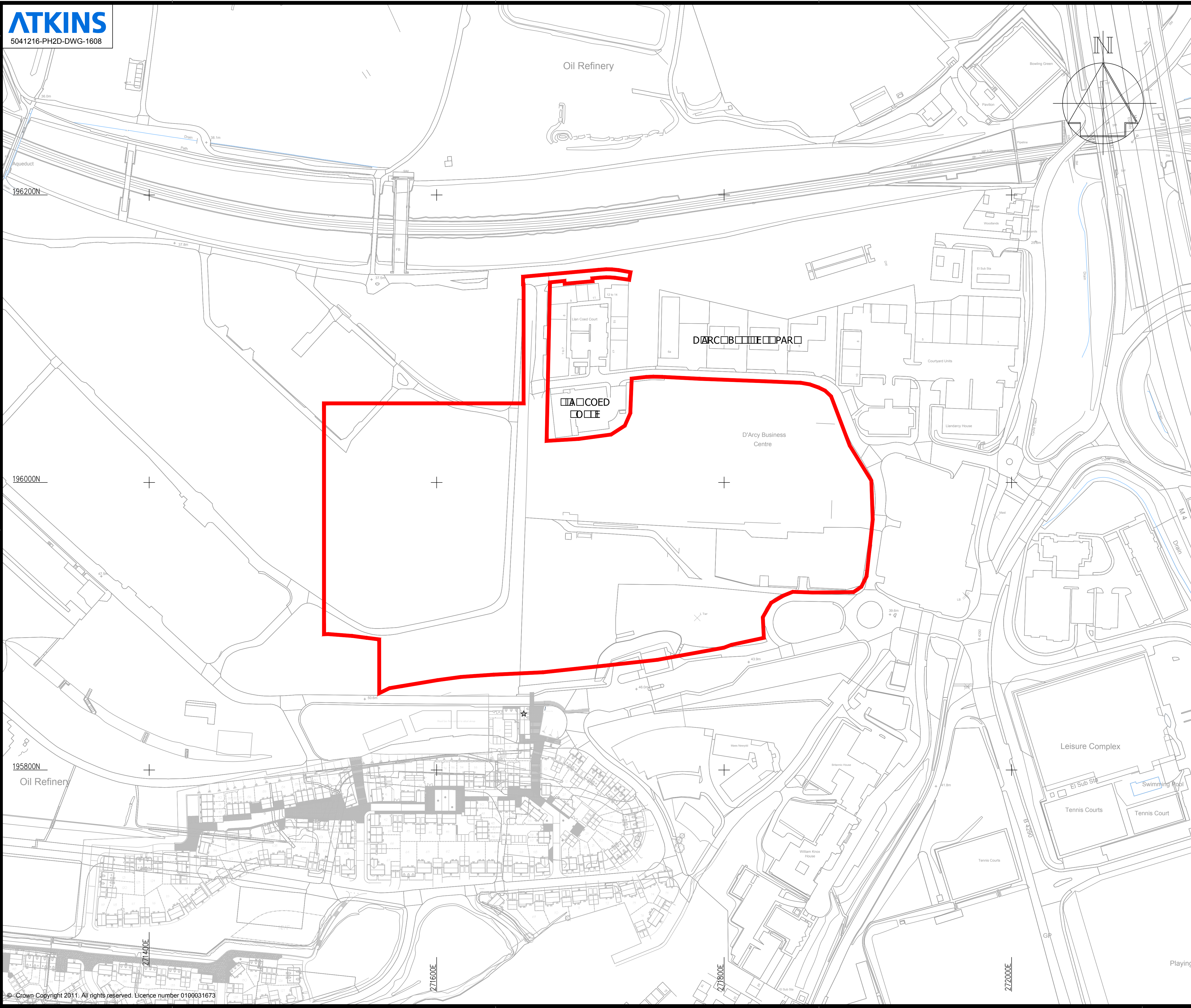
Cc Rhys Mander, Llancoed House, Coed Darcy, Neath, SA11 8AZ

St. Modwen Properties PLC

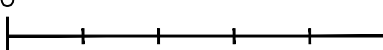
Head Office & Registered Office: Sir Stanley Clarke House, 7 Ridgeway, Quinton Business Park, Birmingham, B32 1AF

T: [0121] 222 9400 **W:** www.stmodwen.co.uk

Registration: England 349201



KEY
COMMERCIAL AREA PHASE BOUNDARY

REVISIONS		Drawn By	Checked By	Date
VALIDATION REPORT		-	MP	21/11/13
PURPOSE OF ISSUE		Rev.	Authorised for issue	Date
Atkins Limited Birmingham Office The Axis, 10 Holliday Street Birmingham West Midlands B1 1TF Tel 0121 483 5000 Fax 0121 483 5252 © THIS DRAWING IS NOT TO BE SCALED				
CLIENT 				
PROJECT COED DARCY				
DRAWING TITLE COMMERCIAL AREA PHASE BOUNDARY MONITOR PHASE 28				
Scales 1:1250	DRAWN JSD	CHECKED SB	CO-ORD CHECK	
	DATE 13/11/13	DATE 13/11/13	DATE	
0 		SHEET A1	PLOT DATE 05.08.14	
DRAWING NO 5041216-PH2D-DWG-1608			REV -	

*A E I B S C E L E O F T E
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SCHEDULE 8

Redevelopment Remediation Works

Purpose, objectives and requirements of the Redevelopment Remediation Works

Part 1

1. Purpose and objectives of the Redevelopment Remediation Works

- 1.1 The purpose and objectives of the Redevelopment Remediation Works are the carrying out of all such Remedial Action over and above that actually carried out as part of the RAP Works that is necessary in order to make each part of the Property suitable within the meaning of paragraph 1.2 below for its Intended Use or such other use as may be determined from time to time.
- 1.2 A part of the Property will only be suitable for its Intended Use or such other use as may be determined from time to time if and when the Phase Works Completion Date is declared in respect of that part of the Property.

Part 2

2. Developer's obligations regarding Redevelopment Remediation Works

- 2.1 The Developer shall carry out or procure the carrying out of all Remedial Action necessary in order to achieve the purpose and objectives set out in Part 1 of this Schedule.
- 2.2 The design and specification of the Redevelopment Remediation Works shall take appropriate account of the principles and objectives (as set out in sub-paragraph 1.3 (including 1.3.1-1.3.5 thereof) of Schedule 7 hereto) and the design assumptions of the RAP Works and shall not prejudice the achievement and future sustainability of these principles and objectives of the RAP Works or the RAP Works themselves.
- 2.3 The Redevelopment Remediation Works may reduce the reliance on the RAP Works to achieve the principles and objectives of the RAP Works set out in sub-paragraph 1.3 (including 1.3.1-1.3.5 thereof) of Schedule 7 hereto but must not increase that reliance.
- 2.4 The RBSLs set out in Tables 1 and 2 below and the aesthetic criteria, remediation quality and scope (including the depth below Final Finished Level to which quality standards are achieved) as also set out in Part 3 below, as the same may be varied in accordance with this Schedule 8, shall be achieved for each part of the Property at the minimum validation frequencies set out in clause 8 of Part 3 (as applicable depending upon whether such part of the Property is intended for use as residential, commercial or recreational land) as a minimum base level standard.
- 2.5 Without prejudice to the requirement to achieve the RBSLs set out in Tables 1 and 2 as a minimum base level standard, the Developer shall ensure that all necessary remediation targets are developed and used to determine the extent and quality of remediation appropriate to the development design and purpose of the Urban Village and the Pre-Transfer Date Contamination.
- 2.6 The Developer shall promptly notify CDL and the Monitor if at any time it or any person acting on its behalf identifies a substance present at, in, on or under the

Property, or has reasonable cause to suspect such presence, for which no RBSL is specified in Tables 1 or 2 of Part 3 below in which case the following procedure shall apply:

- 2.6.1 As soon as reasonably practicable after serving a notice under paragraph 2.6 above, the Developer shall prepare proposals for soil and groundwater RBSLs for the substance identified that are consistent with the purpose and objectives of the Redevelopment Remediation Works as set out in Part 1 of this Schedule and the standards of prevailing Environmental Law and shall provide a copy of such proposals to CDL the Monitor and the Authority. Any such proposal shall contain a detailed statement of the health risk assessment and general methodology from which the proposed RBSLs have been derived.
 - 2.6.2 Not earlier than 10 Working Days after submitting its proposals to CDL the Monitor and the Authority in accordance with sub-paragraph 2.6.1 above, the Developer shall submit a written request to the appropriate Environmental Authorities, copied at the same time to CDL the Monitor and the Authority, for approval of the use of the proposed RBSLs. The Developer shall provide to the appropriate Environmental Authorities with its request copies of the health risk assessment and general methodology referred to in sub-paragraph 2.6.1 above and a copy of this Agreement clearly drawing attention to the purpose, objectives and requirements of the Redevelopment Remediation Works set out therein and the proposed changes thereto.
 - 2.6.3 Each of the Developer, CDL and the Monitor shall be free at any time to make such submissions to the appropriate Environmental Authorities in relation to the Developer's proposals as they see fit, provided such submissions are made in writing and copied to each other and the Authority at the same time.
 - 2.6.4 The Developer shall ensure that the Redevelopment Remediation Works achieve compliance with any RBSLs approved in writing by the appropriate Environmental Authorities pursuant to this paragraph 2.6, as if they were also set out in Tables 1 and 2 of Part 3 of this Schedule.
- 2.7 The Developer may at any time propose variations to the requirements of clauses 3 to 8 inclusive of this Schedule 8 below to the appropriate Environmental Authorities and to the Authority pursuant and to the extent required to comply with the Planning Permission to take account of changes of circumstances since the date of this Agreement, provided no variation shall be proposed that is in any way prejudicial to the achievement of the purpose and objectives of the Redevelopment Remediation Works as set out in Part 1 above and, in particular, the achievement of the RBSLs set out in Tables 1 and 2 above (as previously amended in accordance with paragraph 2.6 above if applicable) and provided further that
- 2.7.1 Any such proposals shall be submitted in writing to CDL the Monitor and the Authority at least 10 Working Days before they are submitted to any Environmental Authority;
 - 2.7.2 Any such proposal submitted to any Environmental Authority shall be copied to CDL the Monitor and the Authority at the same time;
 - 2.7.3 The Developer shall enclose a copy of this Agreement with any such proposal made to any Environmental Authority clearly drawing attention to the

purpose, objectives and requirements of the Redevelopment Remediation Works set out therein and the proposed changes thereto;

- 2.7.4 Each of the Developer, CDL and the Monitor shall be free to make such submissions to the appropriate Environmental Authorities in relation to the Developer's proposals as they see fit, provided such submissions are made in writing and copied to each other and the Authority at the same time.
 - 2.7.5 Subject to paragraph 2.7.6 no such proposed variation shall be implemented unless, it has been approved in writing by the appropriate Environmental Authorities in accordance with the requirements of this clause 2.7.
 - 2.7.6 If the Developer has only oral approval (or non objection) to a proposed variation from the relevant Environmental Authorities, no such proposed variation shall be implemented unless the Developer notifies the relevant Environmental Authorities in writing (copied at the same time to CDL the Monitor and the Authority) that it proposes to proceed with the implementation of the proposed variation to the Redevelopment Remediation Works 10 Business Days after the date of such notice and no written objections of any relevant Environmental Authority are received within such 10 Business Day period in respect of the same.
 - 2.7.7 Any reference in this Agreement to the Redevelopment Remediation Works shall be to the Redevelopment Remediation Works as varied in accordance with this paragraph 2.
- 2.8 The Developer shall, and shall procure that any person acting on its behalf in relation to any aspect of the Redevelopment Remediation Works required by this Schedule 8 shall, at all times comply with the requirements of Schedule 10 (General Remediation Requirements).

Part 3

Table 1 – Summary of Soil RBSLs

Contaminant	Land-Use Specific Soil RBSL Surface to 1m below FFL (mg/kg) ¹			Land-Use Specific RBSL Soil below 1m depth (mg/kg)		
	Residential	Commercial	Recreational	Residential	Commercial	Recreational
METALS & METALLOIDS						
Arsenic	64	500	64	-	-	-
Cadmium	2.6	1400	2.6	-	-	-
Chromium	130	5000	200	-	-	-
Mercury	1	480	1	-	-	-
Nickel	50	5000	75	-	-	-
Selenium	3	8000	3	-	-	-
Lead	337	750	337	-	-	-
Vanadium	416	16000	640	-	-	-
Copper	478	-	478	-	-	-
Zinc	200	-	200	-	-	-
ORGANIC SPECIES						
Benzene	0.12	5	13	0.4	5	48
Benzo(a)pyrene ²	0.9	29	0.9	none	none	none
Toluene	36	1160	8110	52	389	none
Ethylbenzene	41	122000	4740	140	none	none
Xylenes	32	121000	7940	58	none	none
1,2-Dichloroethane	0.04	2	4.5	0.1	0.65	6
Dichloromethane	5	1650	241	84	665	6220
Tetrachloroethene	11	1050	641	34	368	1780
Trichloroethene	1	84	193	2	28	269
Vinyl Chloride	0.01	4	0.7	0.04	1.6	16
1,2 Dichloroethene	4	273	632	7	91	881
1,1,1-Trichloroethane	154	577000	27900	160	3250	none
TPH Aromatic EC>C7-C8	125	1840	21337	146	617	none
TPH Aromatic EC>C8-C10	94	913	4025	257	547	none
TPH Aromatic EC>C10-C12	118	26515	4589	1394	none	none
TPH Aromatic EC>C12-C16	131	64875	4799	none	none	none
TPH Aromatic EC>C16-C21	82	51449	3639	none	none	none
TPH Aromatic EC>C21-C35	1130	51449	3639	none	none	none

TPH Aliphatic EC>C6-C8	8335	8517587	606191	none	none	none
TPH Aliphatic EC>C8-C10	112	158890	12075	158	none	none
TPH Aliphatic EC>C10-C12	3204	163360	12094	none	none	none
TPH Aliphatic EC>C12-C16	4513	169032	12117	none	none	none
TPH Aliphatic EC>C16-C21	94174	3429944	242573	none	none	none
TPH Aliphatic EC>C21-C35	94820	3429944	242573	none	none	none
Total TPH (Phase 1) ³	1717	81413	9061	9182	81956	none
Total TPH (Process Area) ³	2601	44344	10830	4098	35014	none
Total TPH (North Tank Farm) ³	1104	25875	9419	3802	13974	none
Total TPH (South Tank Farm) ²	1015	37230	6349	2792	34797	none
ASBESTOS						
Sum of all Types of ACM	200	300	200	200 ⁴	-	-

“-“ value not applicable to scenario

“none” RSBL value exceeds soil saturation limits and free phase assessment appropriate

¹ Lower value of human health RBSL or Soil Code value if higher than background LCL value (applicable to metals & metalloids only)

² Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach

³ ‘Total’ TPH RBSL derived for an area of development, based on individual RBSLs provided and available mass fraction TPH data in soil at time of derivation, using the inverse weighted average approach.

⁴ See text below for specification of relevant depth ranges

Table 2 – Summary of RBSLs for Groundwater

Contaminant	Land-Use Specific RBSL (mg/l)		
	Residential	Commercial	Recreational
TPH Aliphatic EC>C6-C8	none	none	none
TPH Aliphatic EC>C8-C10	none	none	none
TPH Aliphatic EC>C10-C12	none	none	none
TPH Aliphatic EC>C12-C16	none	none	none
TPH Aliphatic EC>C16-C21	none	none	none
TPH Aliphatic EC>C21-C35	none	none	none
TPH Aromatic EC>C7-C8	20	97	none
TPH Aromatic EC>C8-C10	22	none	none
TPH Aromatic EC>C10-C12	none	none	none
TPH Aromatic EC>C12-C16	none	none	none
TPH Aromatic EC>C16-C21	none	none	none
TPH Aromatic EC>C21-C35	none	none	none
Benzene	0.7	6	198
Benzo(a)pyrene	none	none	none
Toluene	47	229	none
Ethylbenzene	102	506	none
Xylenes	43	607	none
1,2-Dichloroethane	0.2	0.82	45
Dichloromethane	150	624	none
Tetrachloroethene	22	115	none
Trichloroethene	2.6	13	813
Vinyl Chloride	0.06	0.3	18
1,2-Dichloroethene	15	68	none
1,1,1-Trichloroethane	193	989	none

“none”= theoretical RBSL greater than solubility limit

3. Scale of aesthetic criteria

Table 3 – Scale of aesthetic criteria

Class	Visual	Olfactory
0	No visible staining of soil, no visible suspect ACM	No detectable odour on soil
1	Occasional staining of soil, no visible suspect ACM	Faint odour on soil
2	Frequent staining of soil	Distinct but not strong odour on soil
3	Occasional heavy staining of soil	Strong odour on soil
4	Heavy staining of soil	Strong odour discernable in ambient air
5	Visible hydrocarbon product	Overwhelming Odour

3.1 Visible suspect ACM refers to asbestos containing material visible to the naked eye which a reasonable and prudent person used to managing asbestos may suspect to be asbestos containing.

3.2 All references in Table 1 above to depths to which minimum RBSLs are to be achieved are expressed below, relative to FFL following completion of construction of the intended Urban Village.

4. Residential End-Use where Groundwater is Primarily in Rock

4.1 This remediation scenario is intended to refer to residential end-use in areas where there is limited soil material over bedrock, little perched groundwater is present in that soil, and the water table is normally first encountered in bedrock. Areas of the Property with these characteristics include the more elevated parts of the former process area and of the southern tank farm. The minimum Remedial Action required in this scenario is as follows:

4.2 All oil saturated soil should be removed.

4.3 All soils must be remediated so as to meet the RBSLs for TPH, BTEX and PAHs at the relevant depth relative to FFL and the aesthetic criteria Class 2 or better at greater than 1m below FFL.

4.4 The aesthetic quality of soils shall be Class 1 or better for at least the first metre below FFL.

4.5 Soils where there is visible ash and clinker, or metal concentrations above RBSLs, are to be removed so that none is retained within the first metre below FFL in garden areas.

4.6 Where it is not practicable to address groundwater contamination within bedrock this must be controlled, e.g. where seeps, sheens and iron staining discharge from the bedrock. Acceptable methodologies for remediation may include, but are not limited to, the use of land drainage via interceptors. Control measures should result in no visible discharge at surface and little or no odour observable.

4.7 All soil potentially containing dispersed asbestos fibres or visible ACM must be removed or remediated to meet in bulk, considering both dispersed fibres and pieces

of ACM, the appropriate ACM RBSL, or to meet the requirements of relevant Environmental Authorities, whichever is the more conservative.

5. Residential End-Use where Groundwater is in soil

- 5.1 This remediation scenario is intended to refer to residential end-use in areas where there is sufficient soil material over bedrock to commonly contain perched groundwater such that the water table is normally first encountered in soil. Areas of the Property with these characteristics include the lower parts of the former process area and of the southern tank farm and the north site tank farm. The minimum Remedial Action required in this scenario is as follows.
- 5.2 All oil saturated soils and free product shall be removed.
- 5.3 Soils must be remediated so as to meet the RBSLs for TPH, BTEX and PAHs to a minimum depth of 0.5m below the likely seasonal minimum groundwater depth following development of the intended Urban Village. This depth is to be established by consideration of all available groundwater level monitoring data relevant for each area. All soil must meet aesthetic criteria Class 2 or better to the same depth.
- 5.4 All soil must meet aesthetic criteria Class 1 or better to at least 1m below FFL.
- 5.5 Soils where there is visible ash and clinker or metal concentrations above RBSLs to be replaced to at least 1m below FFL.
- 5.6 All soil potentially containing dispersed asbestos fibres or visible ACM must be removed or remediated to meet in bulk, considering both dispersed fibres and pieces of ACM, the appropriate ACM RBSL, or the requirements of relevant Environmental Authorities, whichever is the more conservative, to a minimum depth of 2m below FFL.
- 5.7 Where there is a risk of the migration in ground of hazardous gas or vapour or contaminated liquid into remediated areas, the Developer shall take all necessary measures appropriate to prevent this occurring, including monitoring whatever measures are put in place after their installation to continue to demonstrate their effectiveness. Such measures could include the installation of interception trenches and management of discharge from these.
- 5.8 Where necessary, seeps, sheens and iron rich discharges from the bedrock must be permanently controlled such that there is no visible discharge at surface and little or no odour detectable. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.

6. Commercial End-Use where Groundwater is in soil

- 6.1 This remediation scenario is intended to refer to commercial end-use in areas where there is sufficient soil material over bedrock to commonly contain perched groundwater such that the water table is normally first encountered in soil. The area identified for commercial development in the Masterplan is the lower part of the former process area, which in general terms has these characteristics. Based on the Masterplan, no commercial developments are currently envisaged where groundwater is primarily encountered only in rock; in the event such development is proposed, Remedial Action consistent with the standards specified below would be required, adapted as necessary to local conditions.

- 6.2 All oil saturated soils and soil containing free product other than minor sheens shall be removed to a minimum depth of 2 m FFL or 0.5 m below the likely lowest seasonal groundwater elevation following development of the intended Urban Village, whichever is the deeper. This depth is to be established by consideration of all available groundwater level monitoring data.
- 6.3 All soils must meet the RBSL for TPH to at least 1m below FFL.
- 6.4 All soils must meet in bulk, considering both dispersed fibres and pieces of ACM”, the RBSL for ACM to at least 1m below FFL and any visible ACM encountered during construction in the first 1m below FFL is to be removed.
- 6.5 Where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring. Such measures could include the installation of interception trenches and management of discharge from those. The Developer shall monitor whatever measures are put in place after their installation to continue to demonstrate their effectiveness.
- 6.6 Where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.

7. Public Open Space

- 7.1 The Developer shall remediate areas of the Property which will not be developed for residential or commercial end-uses based on those areas falling into one of the following three broad categories of land-use:
- 7.1.1 Well managed parks and public gardens;
- 7.1.2 More lightly managed areas where public access is encouraged;
- 7.1.3 Areas to which access is discouraged but occasional access and/or trespassing is possible.
- 7.2 The degree of protection that will need to be afforded to people will be largely dependent upon how the access to these areas is encouraged/discouraged and managed. For guidance only, access may be discouraged by physical barriers such as fencing, or vegetation, or actively managed by the provision of walkways along which controlled access is encouraged. The topography of the site may encourage children to use bikes, potentially causing rutting of the ground surface and exposing soils at depth. Detailed designs in this regard will be prepared by the Developer approved by CDL and agreed with the Environmental Authorities to (i) protect human health considering the reasonably anticipatable use of the land (ii) achieve the relevant RBSLs (recreational RBSLs being provided in Table 1 above) to an appropriate depth and (iii) include an appropriate scheme of validation testing.

8. Validation

- 8.1 As a minimum validation of RBSL's will be required to include:
- 8.1.1 Determining the necessary extent of remedial excavations: this will be the responsibility of the Developer;

- 8.1.2 Quality assurance of imported materials, including testing of imported materials for contamination if it is intended to use reclaimed aggregates, top soil, etc: this will be the responsibility of the Developer, however, CDL may elect to validate such materials in-situ, once they are finally placed for construction;
- 8.1.3 Quality assurance of soils treated on the site for re-use: this will be the responsibility of the Developer, however, CDL will validate such materials in-situ, once they are finally placed for construction, and;
- 8.1.4 Quality assurance of soils for which no remedial works are identified: this will be the responsibility of the Developer, however, CDL will validate such materials.

8.2 As a minimum, sampling at the following frequencies should be undertaken.

Table 4 - Minimum Validation Testing Frequencies.

Testing for the Validation Suite at the following frequency:	Shallow Soils (Residential <1m FFL)	Deeper Soils (Residential >1m below FFL)	Soils (Commercial all relevant depths)
Imported quarried material	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples
Imported soil from verified greenfield site	1 per 250m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples
Imported soil from characterised brownfield site ¹	1 per 25m ³ ex situ, composite of 5 sub-samples	1 per 50m ³ ex situ, composite of 5 sub-samples	1 per 100m ³ ex situ, composite of 5 sub-samples
0.5-1m below FFL in-situ	Regular grid of 1 per 50m ² , sample over 0.5m depth	n/a	Regular grid of 1 per 400m ² , sample over 0.5m depth
>1m below FFL in-situ	n/a	Regular grid of 1 per 100m ² , sample over 1m depth	Regular grid of 1 per 400m ² , sample over 0.5m depth
Stockpiled excavated site materials for re-use	1 per 50m ³ ex situ, composite of 5 sub-samples	1 per 100m ³ ex situ, composite of 5 sub-samples	1 per 400m ³ ex situ, composite of 5 sub-samples
Face of remedial excavations <1m deep	1 per 10m, minimum of 1 per face, worst case VO sample	n/a	1 per 15m, minimum of 1 per face, worst case VO sample
Face of remedial excavations >1m deep	n/a	1 per 10m ² , minimum of 1 per face, worst case VO sample	1 per 15m ² , minimum of 1 per face, worst case VO sample
Along redundant service excavations	1 per 20m of trench, worst case VO sample	1 per 20m of trench, worst case VO sample	1 per 20m of trench, worst case VO sample
Soil treated ex-situ and homogenised	1 per 200m ³ , composite of 5 regular sub-samples	1 per 200m ³ , composite of 5 regular sub-samples	1 per 500m ³ , composite of 5 regular sub-samples

¹ Validation suite to reflect prior use of the originating brownfield site and the design and purpose of the relevant area of Coed Darcy.

VO = visual / olfactory (ie aesthetic) observation

- 8.3 The quality of all material placed as fill and/or remaining in-situ post-construction of the Urban Village must as a minimum meet the relevant RBSLs and aesthetic standards at the frequencies set out above (in either case as the same may be amended in accordance with this Schedule).
- 8.4 In all circumstances, CDL and/or the Monitor may at its discretion take additional samples if it has reason to suspect that material may not meet the relevant RBSLs and

aesthetic standards (in either case as the same may be amended in accordance with this Schedule).

- 8.5 All validation samples obtained by CDL and/or the Monitor whether according to the above frequencies or on a discretionary basis must on analysis be of the same or better quality than the relevant RBSLs and meet or exceed the relevant aesthetic criteria (in either case as the same may be amended in accordance with this Schedule).

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Copies of the Information Sources are provided electronically

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Request for Information

Contract Name: Coed D'Arcy **O** **ITOR** RFI No:
Contract Number: GNP/NJR/13773-2 Date Raised: 21/3/2011
Subject: Commercial Area Proposed Site Investigation
To: Mark Williams Atkins
From: Simon Gibbons / Simon Cole URS

Response Required Within:

1 Day		3 Days		5 Days	X	10 Days	
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Comments

The following general comments are provided in response to Atkins 'Commercial Area Proposed SI Investigation', dated 17th March 2011, ref 5041216-PLOTS-TN-000542.

These comments are in addition to those raised by the Monitor in separate e-mail correspondence.

The general approach appears reasonable within the context of the S106 and commercial redevelopment of this area of the site. There are a few queries which should be considered ahead of completing the work;

The remediation works specify all soils to at least 1 metre should meet or exceed the current RTC/RBSL thresholds. Please can you add clarification for deeper soils.

For the Churngold remediation can Atkins provide more certainty in terms of what was or wasn't completed in the top 2 metres of the soil profile in the CRL remediated area. If there is uncertainty about what CRL claim to have done or the extent to which they are known to have excavated material and/or replaced treated material then further work may be required than indicated in the Technical Note.

Will the desk study be issued prior to completing the proposed scope of works?

Is there any reason for a regular grid rather than one biased towards potential hotspots based on the desk study?

How will linear features such as redundant chemical drains, etc be treated in this process? Will there be any attempt to remove obstructions prior to the validation works?

What V/O scores are considered acceptable at various depths and how will these be recorded (every 0.5m in trial pits, etc?)

Will any additional data be collected to assess the requirement for protective measures to be employed around the periphery of this Phase (i.e. groundwater interception trenches, etc)?

In the drawing the remediated area by Churngold appears to extend west beyond the site fenceline. It is unlikely this fence was removed during the CRL work and reinstated so it may be appropriate to check the extent and reduce this eastwards of the fence.

Signed:

Date: 21/03/2011

Reply

Signed:

Date:

istribution

To	cc	Name	Company	Fax No
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X		Mark Williams	Atkins	
X		Michelle Lee	Atkins	
	X	Mike Poland	Atkins	

Contract Name:	Coed Darcy Monitor	RFI No:
Contract Number:	GNP/NJR/13773-2	Date Raised: 7 March 2012
Subject:	Review of Atkins' Commercial Area Remediation Strategy	
To:	Michelle Lee	Atkins
Cc:	Mike Poland	Atkins
From:	Rhys Mander	URS

Response Required Within:	1 Day		3 Days		5 Days		10 Days	✓
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Comments

This RFI has been prepared following a review of Atkins' Geo-Environmental Assessment and Outline Remediation Strategy for the Proposed Commercial Area, ref. 5041216-PLOTS-RPT-000626 dated December 2011.

Generally the proposed remediation strategy outlined in section 8 of the report appears to be reasonable and appears to be in line with the requirements of the Section 106 Agreement. A number of observations and/or queries are noted in respect of the report, which are outlined below:

- Page 4 – The report refers to Atkins' Controlled Waters Risk Assessment ref. 5041216/REM/RPT/724. Please could a copy of this report be provided.
- Page 6 – The report assumes that existing ground levels will be maintained for the final development. Atkins should justify the appropriateness of this assumption. Further consideration should be given to the terraced area within the southern part of the site (i.e. the car park etc.) where ground levels could change significantly. Confirmation of the FFLs will be required to enable the Monitor to issue the RRWCC on completion of the works.
- Page 8 – Reference is made to Japanese knotweed. Although outside the Monitor's scope, could the report confirm when the Japanese knotweed was removed and whether or not subsequent inspections have been made.
- Page 10 – The report suggests that the levels of contamination reported historically may have reduced considerably. This is considered unlikely, other than within the area remediated by Churngold,
- Page 10 – The report states that URS' validation samples were only tested for TPH and not for speciated hydrocarbons and it is therefore not possible to compare this data with the current RBSLs and RTCs. With reference to URS' risk assessments it should be possible to determine speciated results.
- Page 11 – The report states that only recent data has been assessed. There is no indication as to what data has been included and what data has been excluded.
- Page 11 – The report again refers to the lack of FFL information and states that an assessment has been carried out based on current ground levels. Please could you confirm which screening criteria has been used (i.e. commercial shallow soils, or commercial deep soils) because soils that are deep now, may become shallow when the site is 'turned over'.
- Page 11 – With reference to Atkins' observations regarding free product locally within the site, but the lack of RBSL exceedances, it should be noted that the commercial RBSLs may be such that the RBSLs may be met, but there could still be failures based on the aesthetic criteria.
- Page 11 – The report makes reference to data collected from a borehole outside the plot. The significance of this data is not explained – i.e. is it close to the boundary, is it up gradient? Furthermore, data from 1999 is referenced. Has any subsequent monitoring been carried out?
- Page 11 – It is not clear why Drinking Water Standards are relevant.
- Page 15 – The report refers to peaty soils noted to be often heavily contaminated with free product. Will these peaty soils be removed if they are situated below the depth of remediation set out in the Section 106 Agreement (i.e. if they are deeper than 2m etc.)?
- Page 16 – The report refers to asbestos. Please confirm what volumes of asbestos were found. Page 19 suggests further investigation is required. What will this entail?
- Page 19 – The report refers to statistical analysis. This data should be included as an appendix.

- Page 19 – Is the application of statistical analysis necessary if the hotspots are going to be removed anyway?
- Page 19 – The report states that some of the hotspots will be removed. Why only some?
- Page 19 – Tables 5.6 and 5.7 list the exceedances found in made ground and natural ground. Can there be some consideration as to the significance of these. For example an exceedance for 1,2 DCE is likely to be as a result of an historic spillage or some other similar event, whereas the other exceedances are likely to be due to the composition of the made ground and are perhaps less significant in made ground.
- Page 19 – Tables 5.6, 5.7, 9.1, 9.2 and 9.3 refer to 1,2 DCE and 1,2 DCA. Please confirm which is correct.
- Page 21 – Reference is made to shallow mine workings. Whilst ground stability is not within the Monitor's scope, the production of methane (discussed later) could be attributable to mine workings. A cross section showing the seams and the location of the outcrops in relation to the site would be useful to understand the issues.
- Page 22 – Ground gases have been monitored over nearly a three-year period. Please could the report explain why some wells have been monitored up to 18 times, whereas others have only been monitored 3 times.
- Page 22 – Table 6.1 highlights occurrences of high methane levels. The data shown gives a range of concentrations corresponding to a number of monitoring events. Data for individual monitoring events giving the concentrations and the flow rates should be provided to ascertain whether or not methane is consistently being produced at any of the locations. On page 24 it is stated that the high methane concentrations are considered to be unrepresentative. This further evidence required to confirm this.
- Page 23 – Results from DM20 are discounted due to an adjacent hotspot which could interfere with results. This is considered unlikely.
- Page 27 – The report states that free product identified during groundwater monitoring will be pumped out and then the wells monitored for recharge thicknesses. Due to the nature of the ground, any zone of influence is likely to be relatively localised. As such, the absence of free product should not necessarily be used as an indication that oil saturated soils are not present.
- Page 29 – The report states that the plot will be 'turned over'. Please explain what this means exactly.
- Page 30 – The report states that the southern part of the site will remain in use to be remediated as part of a later phase. It is noted that works have started in this area. Will this section of the report be re-drafted?
- Drawing 882 – The conceptual site model does not recognise the terraced nature of the plot and the implications for the depth to which the site may need to be remediated. An indication of the layout of the coal seams would also be useful.

Signed:



Date: 7 March 2012

Reply

Signed:

Date:

istribution

To	cc	ame	Company
✓		Michelle Lee	Atkins
	✓	Mike Poland	Atkins

From: Rhys Mander
To: ["Bamforth, Selina"](#)
Cc: ["Poland, Michael"](#); ["Lee, Michelle"](#); [Geoffrey Jones](#); [Morris, Howel](#)
Subject: Coed Darcy Monitor RFI111: Phase 28 - Utilities Corridor Embankment
Date: 16 April 2013 10:59:00

Selina

I can confirm that URS has reviewed the utilities corridor embankment validation technical note. Having monitored the works on site I am satisfied that they have been carried out appropriately and in line with the requirements of the s106 agreement. We are therefore preparing the necessary completion statement and certificate. We have a few queries though, which I'd be grateful of your thoughts on to allow us to finalise the certificates.

- The first point to note is that URS is satisfied that the import of the solidified/stabilised material from North Site Reservoir does not form part of the remediation works for Phase 28 but that the validation of the solidified/stabilised material will form part of the sludge treatment works in relation to the RAP works for North Site Reservoir. With this in mind, please ensure Hydrock is collecting samples from the solidified/stabilised material as it is placed, as agreed previously. Please note that the Monitor's completion statement and certificate will only consider the ground underlying the embankment.
- Please forward the outstanding test results when received (i.e. the results from hotspot removal carried out 4th April 2013 and the validation trial pits and CAV pits).
- Whilst it is recognised that the frequencies specified in the s106 agreement have been achieved, it is noted that the sample locations in the 'northern section' and 'southern section' shown on drawing no. 1484 are more widely spread out. Please provide the logs for investigations carried out within these locations to assist in determining whether or not these areas pose a risk. Is Atkins satisfied that these areas are acceptable? Was any free product noted? Please also provide more details of the trial pit to south of the northern section which is briefly discussed in the technical note.
- At the bottom of page 6, the report states that 7 samples were taken from the turned over material. Has the volume of turned over material been quantified to confirm the requirement for 7 samples?
- Please could the report discuss the potential for recontamination from unremediated areas and whether or not this is considered a risk. Please discuss the measures that have been put in place to avoid re-contamination - for example the interception trenches - and whether or not these will be retained.
- Ochreous seepages were observed during the works and continue to be observed. Please discuss how this will be managed as the site is redeveloped.
- The remediation strategy discussed ground gases. Please provide further details of preventative measures such as ground gas membranes etc.
- Is a draft development layout available?

Regards

Rhys Mander MEng CEng MCIHT
Senior Engineer
URS Infrastructure & Environment UK Limited

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URS Infrastructure & Environment UK Limited

Place of Registration: England & Wales

Registered Number: 880328

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From: Rhys Mander
To: ["Bamforth, Selina"](#)
Cc: ["Poland, Michael"](#); ["Lee, Michelle"](#); [Geoffrey Jones](#); ["Morris, Howel"](#)
Subject: Coed Darcy Monitor RFI112: Phase 28 - Utilities Corridor Embankment
Date: 26 April 2013 16:17:00

Selina

Further to my queries raised in RFI111 in relation to Phase 28, I'd be grateful if you could also consider the following:

- Please could you provide an isopachyte drawing showing the depth of the base of the remediation excavation. The report refers to drawing no. 1487 but I'm not sure I have received this.
- Please could you confirm the volume of excavated free product impacted soils that were transported elsewhere for treatment.
- Further to our discussions regarding the failures from the hotspots and the asbestos, I'd be grateful if you could update your validation report to cover these points and confirm what further works have been done/will be done to address the issues.
- The Section 106 Agreement states that where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring. Please confirm whether or not this is a concern.
- The Section 106 Agreement states that where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour. Please discuss how the seepages that were observed have been managed. For example one of the seepages at the southern end of Phase 28 was chased out and backfilled with crushed sandstone. Where does this discharge to? Is groundwater quality a concern?
- The Section 106 Agreement states that wherever there is a risk that following construction of the Urban Village groundwater or organic phase liquid may contaminate soils within the top 1m below FFL such that any of the relevant RBSLs and/or aesthetic criteria may be exceeded, then all necessary steps should be taken to mitigate these risks. This may involve the installation of land drains and/or the raising of the site ground levels. Please confirm whether or not such measures are considered necessary.

Thanks

Regards

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Registered Office: Scott House, Alencon Link, Basingstoke, Hampshire, RG21 7PP, United Kingdom

From: Rhys Mander
Sent: 16 April 2013 10:59
To: 'Bamforth, Selina'
Cc: 'Poland, Michael'; 'Lee, Michelle'; Geoffrey Jones; Morris, Howel
Subject: Coed Darcy Monitor RFI111: Phase 28 - Utilities Corridor Embankment

Selina

I can confirm that URS has reviewed the utilities corridor embankment validation technical note. Having monitored the works on site I am satisfied that they have been carried out appropriately and in line with the requirements of the s106 agreement. We are therefore preparing the necessary completion statement and certificate. We have a few queries though, which I'd be grateful of your thoughts on to allow us to finalise the certificates.

- The first point to note is that URS is satisfied that the import of the solidified/stabilised material from North Site Reservoir does not form part of the remediation works for Phase 28 but that the validation of the solidified/stabilised material will form part of the sludge treatment works in relation to the RAP works for North Site Reservoir. With this in mind, please ensure Hydrock is collecting samples from the solidified/stabilised material as it is placed, as agreed previously. Please note that the Monitor's completion statement and certificate will only consider the ground underlying the embankment.
- Please forward the outstanding test results when received (i.e. the results from hotspot removal carried out 4th April 2013 and the validation trial pits and CAV pits).
- Whilst it is recognised that the frequencies specified in the s106 agreement have been achieved, it is noted that the sample locations in the 'northern section' and 'southern section' shown on drawing no. 1484 are more widely spread out. Please provide the logs for investigations carried out within these locations to assist in determining whether or not these areas pose a risk. Is Atkins satisfied that these areas are acceptable? Was any free product noted? Please also provide more details of the trial pit to south of the northern section which is briefly discussed in the technical note.
- At the bottom of page 6, the report states that 7 samples were taken from the turned over material. Has the volume of turned over material been quantified to confirm the requirement for 7 samples?
- Please could the report discuss the potential for recontamination from unremediated areas and whether or not this is considered a risk. Please discuss the measures that have been put in place to avoid re-contamination - for example the interception trenches - and whether or not these will be retained.
- Ochreous seepages were observed during the works and continue to be observed. Please discuss how this will be managed as the site is redeveloped.
- The remediation strategy discussed ground gases. Please provide further details of preventative measures such as ground gas membranes etc.
- Is a draft development layout available?

Regards

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Contract Name: Coed Darcy Monitor RFI No:
Contract Number: GNP/NJR/13773-2 Date Raised: December 2014
Subject: Review of Atkins' Commercial Area Validation Report 5041216-PLOTS-RPT-001016 dated September 2014
To: Michelle Lee Atkins
Cc: Mike Poland Atkins
From: Rhys Mander/Joanne Foy URS

Comments

The queries detailed below are raised in relation to Atkins' Commercial Area Validation Report 5041216-PLOTS-RPT-001016 dated September 2014. The following items require clarification:

General

- Overall, the quality of the report and data presentation is such that URS is unable to determine whether or not the requirements of the S106 have been met.
- The S106 requires certain standards to be met in soils to a minimum depth of 2m below FFL or 0.5m below the likely lowest seasonal groundwater elevation following development, whichever is the deeper. Please could you confirm what this minimum depth is with reference to groundwater elevations and FFLs.
- The screening tables in Appendix D are unclear, for example where no criteria are screened against – please make it clear where an analyte has no corresponding criteria. In addition, the ordering of samples listed in the tables is not consistent with the excavation/hotspot they relate to which requires frequent searching to find all the relevant data.
- Appendix D is badly arranged and formatted. Samples are not in any discernable order and samples that appear to relate to each other are distributed throughout the tables. For example in the asbestos table the following samples appear in the following order: CAV09E, CAV101E, CAV34E, CAV40E, CAV09N, CAV101N, CAV34N, etc. This makes it very difficult to use, and it is possible that some of our comments below are simply because the data, whilst there, cannot be found. In addition, some details of sample dates etc. are missing.
- There are a number of exceedences in Appendix D that are not addressed within the text. These include (but are not limited to):
 - o Lead exceedences at CAEMTP27 and 28.
 - o Lead exceedence at CAV022 and 027
 - o Lead exceedences at SP55 samples 1-4
 - o Chromium exceedence at CAV002
 - o Aromatic hydrocarbons C8-10 exceedence at CAEMV036
 - o A large number of vinyl chloride exceedences, however this may be due to detection limits
 - o A carbon tetrachloride exceedence at CHVTP5

Background Compound Area

- The backfill volume used in this area is given as 6,960m³, however only 4,000m³ is accounted for from stockpiles SP48 (3,000m³) and SP Q (1,000m³). Please provide details of the remaining 2,960m³ of material used including its origin, type and analysis frequency and results.
- It is stated that material came from both SP48 and SPQ with only SPQ described as crushed concrete. In the next paragraph it is stated that "the only material used in this area was crushed concrete of a homogeneous nature". Please confirm what type of material was in SP48, and if it was not crushed concrete amend the report.
- It is stated that there were no reported exceedences of the adopted thresholds for retention within a commercial phase, however sample CAV133 from 2m is reported to have a concentration of benzene of 6.73 mg/kg in excess of the 5 mg/kg adopted threshold. In addition, several samples from CAV132 to CAV135 are reported to have vinyl chloride at 0.2 mg/kg in excess of the adopted criteria (0.045 to

0.174 mg/kg for shallow soils). In addition, some samples are shown to have asbestos detected with no quantification provided, please provide this detail. Please confirm what remedial action was taken to deal with these results, and if none was taken, provide a justification. It is noted that no hotspot remediation is shown in this area.

- Results provided for HSP1 and 2 are limited to asbestos only. Asbestos is reported to be detected, however no quantification is provided. Please provide the quantification to demonstrate that the concentrations are below the RBSL for this commercial Phase. It is noted that no hotspot remediation is shown in this area.
- CAV017 also appears to be in the Hawk area (shown on the drawing) but is not included in the text, please confirm why this is. It is also noted that the samples were only analysed for PAH with no tabulated results provided for the remainder of the suite.
- CAV030 and CAV031 also appear to be in the Hawk area (shown on the drawing) but again are not included in the text, please confirm why this is. It is also noted that two samples from CAV030 were reported to contain asbestos however no quantification is provided. Please provide the quantification to show that they are below the RBSL for this commercial Phase. It is noted that no hotspot remediation is shown in this area.
- The requirement is for 1 sample per 400m³ of site derived material. Please provide further justification of why this frequency was not met, particularly given that the statement that it wasn't met due to the concrete nature of the material appearing to be incorrect based on the above questions. It is also noted that the SP48 samples were not analysed for asbestos and HSP samples were only sampled for asbestos, further reducing the stated sampling frequency.

awnus Compound Area

- The backfill volume used in this area is given as 5075m³, however only a partial amount of SPQ is accounted for as the 'running surface', stated as split between the Hawk and Dawnus compounds (total 1,000m³). Please clarify the volume of SPQ fill material and the volume of the remainder turned material (this would be a minimum of 4,075m³ if all of SPQ was used in the Dawnus area for example). Please confirm no other sources of material were used for this area.
- Samples DAWN C7 to C12 dating from the construction are not shown on a figure, please confirm why this is. If it is due to the samples being taken during construction/placement, please confirm if the samples were distributed evenly across the material.
- The text states that DSP1,4 & 5 were taken from this area, however it is noted that the results provided for these samples are limited to asbestos only, please confirm whether there is additional data for other analytes.
- DSP2, 3 and 6 also appear to be in the Dawnus area (shown on DWG948) but are not referred to in the text, please confirm why this is or remove from the drawing if they are not relevant. It is noted that no laboratory data are presented for these samples in Appendix D.
- Asbestos appears to have been analysed for in six samples to 1m bgl (CAV136-138 and DSP1,4 & 5) not including SP Q fill material. This equates to one sample for every 679m³ of the remaining volume which does not meet the requirement of 1 per 400m³ for the stated eight samples. Please provide further justification of why this frequency was not met.
- Asbestos was identified in three deeper samples (CAV136-138) ranging from 3 to 3.35m bgl, no quantification is provided, please clarify in the report that these samples are from post-construction trial pits and that the samples are beneath the required validation depth.
- The available results for the in-situ material equals nine samples (DAWN C7 to C12 and CAV136-138, not including the four samples from any additional SPQ fill material) which equates to one sample for every 450m³ which does not meet the requirement of 1 per 400m³. Please provide further justification of why this frequency was not met.
- The report states that the testing frequency was met by 15 samples including the SPQ samples (4 no.) The sum of DAWN C7 to C12 (6 no.) and CAV136-138 (3 no. if only shallow samples counted) equating to nine samples. Please explain the discrepancy in the stated sampling frequency. It is noted that results provided for DSP1,4 & 5 are limited to asbestos only and therefore cannot be included.

Road Embankment Footprint

- The location of the road embankment footprint is unclear; a figure showing the area would be useful to show what samples are considered to be within the footprint.
- Please clarify if the samples were taken from stockpiles prior to reinstatement or from particular locations during reinstatement.
- The report states that eight samples were collected, however, only four samples SP55 1 to 4 were analysed for the complete suite, reducing the stated sampling frequency.
- SP47-1 & 2 were analysed for the suite with the exception of asbestos, for which an entry in the Appendix D table is listed with no results shown, please clarify whether this was analysed for asbestos and if so, provide the results.
- Granular Backfill 1 & 2 are only listed in Appendix D for asbestos, both of which show detections with no quantification provided. Please provide the quantification results, as at present it cannot be determined whether the samples exceed the RBSL. The sampling frequency for asbestos is therefore 4 samples for 2,500m³ or one per 625m³ and does not meet the requirement for 1 sample per 400m³ of site derived material. Please provide justification for this.
- Exceedances of lead are shown for samples SP55 1 to 4 ranging from 3,050 to 9,510mg/kg against an RBSL of 750mg/kg in samples <1m bgl. The report text does not address these exceedances as it states there were no exceedances, please clarify.
- Exceedances of Vinyl Chloride are indicated in Appendix D for a number of sample locations across the site including samples SP55 1 to 4. Whilst it is possible that these represent a non-detect or formatting error in the tables, please clarify these implied exceedances.

Low Lying area Road Road Function

- Total volume of NSR backfill is stated as 6,500m³, testing frequency of 13 samples (HCV1CT to HCV13CT) equates to 1:500m³. It is suggested that the "homogenous nature" and "consistent achievement of the required quality" is sufficient reason not to meet the testing frequency. This matter has also been queried with Hydrock as part of the NSR certification. Why was this reduced testing frequency not discussed with the Monitor at the time?
- Please confirm the depth of the cap created from the material from CA-SP and SP77 – was all of this material shallower than 1m?
- It is stated that 25 samples were taken from CA-SP but no sample ID's are referenced in the text. In the tables the samples are listed as 'CASP' and number 20 samples, please make the reporting of the sample names and numbers consistent and provide the missing five results. These samples are also duplicated in the results tables, please remove the duplication.
- The report states that 5 samples were taken from SP 77 but no sample ID's are referenced. Please confirm these are the SP77-901 to SP77-905 samples included in Appendix D.
- It is stated that one of the SP77 samples exceeded for asbestos and that it was segregated 'in' the stockpile – please clarify which sample in the text (SP77 -903 in Appendix D table) and that it was segregated 'from' the stockpile and its fate.
- Samples CASP 1, 3 and 4 are noted to contain Amosite (Analyst's comments – Appendix D), however, Amosite is reported in the same table as 'not detected'. Please can you clarify these results.
- With regard to the material taken from CA-SP and SP77, asbestos was tested for in 25 samples and identified in all samples. However, quantification was only carried out on 14 samples equating to 1 per 536m³ prior to re-use on site which did not meet the S106 required frequency – please justify why all samples where asbestos was detected were not quantified prior to re-use as this may have affected the statement that "all samples did not exceed the 300ppm threshold for asbestos given in the S106". Given the in-situ testing of a further 9 samples for asbestos (CAUFV01 to 09) the frequency was latterly met at one per 326m³ (23 samples in total), however the detections of asbestos should have been quantified to show that the RBSL was met in all samples where asbestos was detected.
- The report states that 39 samples of backfill capping material were tested giving a frequency of 1:190m³. This frequency appears to be incorrect. At a total volume of 7,500m³ the frequency equates to between 1:221m³ and 1:357m³ (depending upon the chemical class tested as not all samples were analysed for

every chem class) in between 28 and 34 samples (dependant on analyte). Please amend the report to reflect the correct number of validation samples and their relevant frequency. It is noted however that these amended frequencies meet the S106 requirements.

Hotspot Removals

- The report states that “various hotspots were identified as part of the validation process” – please quantify the number of hotspots encountered and removed (shown on dwg 001615 as Hotspots A-J). A simple list of hotspots would be helpful in this section. It would also be helpful to show the original failure on the hotspot drawings so it is possible to relate the location of the failure to the extent of the excavation.
- Please clarify in the report text if detections below 0.5m are below the FFL 1m depth for commercial development and as such validation was not required.
- Given the points below please amend the report text “All hotspots were removed with base and side samples taken to ensure full removal” to reflect any remaining issues where full removal may not have been achieved.
- Hotspot A – Asbestos:
 - o The text in Appendix F states that the excavation was 25m by 15m however the drawing shows it to be larger than this, please correct.
 - o 14 samples were collected – in all of which asbestos was identified. Quantification was only undertaken on 7 samples, one of which (CAAH 5) is shown as exceeding the criteria in the results table. It is noted based on the sample locations (DWG01615A) that the surrounding samples 4, 6 and 8 were not quantified (although 4 and 6 were recorded as ‘trace’ only). Please confirm why full quantification was not done on samples where asbestos was detected. Without this quantification, it is not possible to determine that the soils meet the RBSL.
 - o Please confirm why no excavation side samples were taken; the S106 requires 1 sample per 15m on all excavation faces where the excavation is <1m deep.
- Hotspot B – Asbestos:
 - o Please amend text to also show that the excavation was extended to the west. Please confirm why this was done given that CAV141-W passed the RBSL.
 - o Please clarify why no samples were taken from the north and west faces of the extended excavation. As above, this is a requirement of the S106.
- Hotspot C – Asbestos:
 - o 10 samples (CAV101 series) collected and all quantified except CAV101-1 (Trace only) and CAV101-2 (detected) at 0.5m depth. Please justify why the detected asbestos was not quantified in these samples.
- Hotspot D – Asbestos:
 - o Please correct the size of the excavation in the text. It states that the excavation was extended by 10m, however the whole excavation is less than 10m by 10m.
 - o The initial results for sample CAV009 do not appear to be in Appendix D. Please ensure this appendix is complete. In addition, text, table and figure sample names are inconsistent, for example - Table lists sample ‘CAV09 1’, figure as ‘CAV009-1’. URS has assumed that in instances such as these they are the same sample. In addition, on the drawing some samples are referenced at CDV rather than CAV. Please correct these.
 - o In Appendix D, CAV009-2 is not shown to have any quantification results, however a “non detect” result is given in Appendix F. Please clarify which is correct, and if no quantification was done, why this was.
- Hotspot E – Asbestos:
 - o DWG001615F shows 14 sample locations prefixed CAV034, however, four of these are duplicated (CAV034 N, E S and W). Two sets of results are presented in the table in Appendix D for these samples with differing results. Whilst they can be separated by date and the data is explained in Appendix F, it is not helpful to have separate sample locations with the same name.
 - o Sample CAV034-2 has asbestos detected described as loose fibres and debris typical of

asbestos lagging, however no quantification was completed and no further excavation. Please clarify why this was.

- Hotspot F/G – Asbestos:
 - o Hotspot F in Appendix F is listed as having samples in the CAV039 series, however in drawing 5041216-REM-DWG-001615E it is shown as having samples in the CAV040 series. Hotspot G has the opposite – CAV040 samples in Appendix F and CAV039 samples on the drawing. Please check Appendix F and the drawing, correct whichever has the error and re-issue.
 - o CAV039 excavation – the text states that the excavation was initially for hydrocarbon but was extended to the east on the basis of the CAV039E result which exceeded the RBSL. The drawing shows this to be on the eastern side, with no further excavation. In addition, all samples shown on the drawing are to the west and are therefore not within the extended area. Please clarify this.
 - o CAV039 excavation – the text states that it was excavated to 0.6m, and separately that it was to 2m, however base sample results are given at 0.5m and 0.8m. Please confirm the base depth of the excavation and which samples were taken from the base. Please also confirm the size of the excavation as the text and drawing do not appear to match.
 - o CAV040 excavation, 8 samples. CAV40 1, 2 and 3 listed in the results tables – do these correspond to CAV040-BASE1, 2 and 3 shown on DWG001615E?
 - o In Appendix D, CAV40-2 is not shown to have any quantification results, however a “non detect” result is given in Appendix F. Please clarify which is correct, and if no quantification was done, why this was.
- Hotspot H – Lead:
 - o DWG001615D shows the initial failure CAV143 and a side sample (CAV143S) to be outside of the plotted excavation. CAV043 and CAV043N are also shown outside of the plotted excavation boundary. Please confirm these were within the excavation and amend the drawing as appropriate.
 - o Samples CAV143 N and CAV144 S are shown on the drawing but are not listed in the results table in Appendix D, please provide the results or remove them from the drawing.
 - o The S106 requires one side sample per 15m length of excavation face for excavations <1m deep. It is noted that this is complied with on all sides of this excavation apart from on the eastern side, which is approximately 50m long. This would require 3 samples. Three samples have been taken, however they are not evenly spaced; there is an approximate 40m gap between CAV524 in the north and CAV143E to the south. It is assumed this is because the excavation was joined onto the asbestos excavation (Hotspot D) to the east, however it is noted that no lead results are supplied for hotspot D therefore the datagap remains. Please provide any data that would fill this gap.
- Hotspot I – Benzene:
 - o DWG1615B shows 10 sample locations (CAEM077, which appears to be the original exceedance based on the results shown in tables in Appendix D; and CAEM037A to I). The Benzene validation results for locations CAEM037A to I are not presented in any of the tables in Appendix D. Please ensure that Appendix D is complete.
 - o Four samples are listed in the tables (appendix D and F) but not shown on the corresponding drawing; CAEM037 HS BASE, HS SIDE, CAEM077 HS BASE and HS SIDE. Please add these to the drawing.
 - o Please also show the location of the original exceedance (CAEM037) on the drawing.
 - o The S106 requires 1 sample per 15m² for excavations over 1m deep with a minimum of 1 sample per side. It is noted that this frequency is not met for any side of the excavation for this hotspot. The northern and southern faces are approximately 30 and 35m long respectively and with a depth of 2m, each would therefore require 4 samples. Only two were taken from each side. No samples were taken from the east or west faces. Please provide the correct amount of data or justify this discrepancy.
 - o The table in Appendix F is incorrectly colour coded with some exceedances not shown, and some samples that did not exceed, marked as exceedances. Please correct this table.

- Hotspot J – Vinyl Chloride:
 - o The S106 requires 1 sample per 15m² for excavations over 1m deep with a minimum of 1 sample per side. It is noted that with only one side sample taken, this requirement has not been met. Please provide additional data or justify this discrepancy.
 - o In Appendix F the table shows sample CAEM 050 HS BASE to be a base sample but with a depth of 0.8m, whereas the side sample (CAEM 050 HS SIDE) is given as 1.6m deep. Please correct this table.
 - o There is inconsistency in the sample names between the drawing, text and tables. URS assumes that the sample listed as CAEMV050 is the same as CAEM050.

groundwater monitoring

- There is insufficient detail on the excavations to remove free-phase hydrocarbon for us to assess this section of the report. The information in the report is limited to a drawing showing which locations free-phase hydrocarbon was detected in with no detail on the extent, depth or validation of the subsequent excavations. Please provide the necessary detail.
- The groundwater elevation table in Appendix D has factual errors in it – for example P1BH024D is listed in one case as P1BH204D.
- Free phase hydrocarbon is listed in the Table in Appendix D as being present in DM19, CA Sump 2, DM6 and DM7 on at least one occasion. These are not highlighted in drawing 949-c as being removed/excavated or having free phase product. Please clarify what remedial measures were undertaken and correct the drawing.
- A number of results in the Table in Appendix D from 21/8/13 appear to show free-phase hydrocarbon present, however this may be a data/formatting error. Please correct and clarify.
- Well MSMW065d is listed as having 22cm of free-phase hydrocarbon present in September 2011, however the well is 10.74m deep therefore the source of the free-phase hydrocarbon may not be shallow. Please confirm the likely source of this hydrocarbon and whether/how it was remediated.
- From a historical URS report (reference 39991-044-785/FR1287 dated 12th August 2005) it is noted that both shallow and deep groundwater is inferred to flow in a north-easterly direction across Phase 28. Please provide information on the potential for this phase to be re-contaminated from adjacent phases.
- It is noted that the table for groundwater RTC in Appendix C contains no indication of units.

Signed: 

Date: 2 December 2014

Reply

Signed:

Date:

istribution

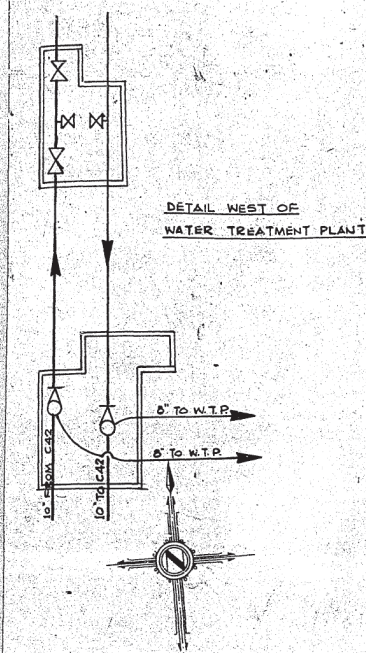
To	cc	ame	Company
✓		Mike Poland	Atkins
✓		Michelle Lee	Atkins

A E I E HISTORICAL A S



ISSUE 1
REVISED - MERON UNIT; POWER STATION 2; SUMP SEPARATORS A & B;
COOLING TOWERS A, B & C; LUB OIL BLENDING DISPATCH PLANT;
BOTTLED GAS DISPATCH PLANT;
TANKS 105, 106, 107, 110, 111, 113, 114, 115; 227 TO 233 INC.;
301 TO 318 INC.; 400 TO 412 INC. 415 TO 430 INC. 433, 434, 437, 438,
102, 108, 109, 210, 211, 212,
REDED - WAREHOUSE STATION, VDU DEHEAT & COOLING TOWER,
WHITE OIL SLACK WITH ROAD LOADING GANTRY, WHITE OIL & LPG
RAIL LOADING GANTRIES; TANK DWA 1, TANKS D3, D4, D5, D7, D8,
D9, D10; LOBBY PARK.

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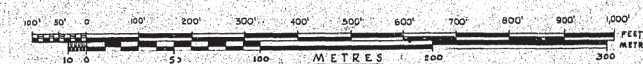


18" OIL LINE FROM ANGLE BAY

TO CATTLE TROUGH

NOT FOR PUBLICATION.

SCALE 3/4" = 100 FEET



15	3.7.75	J.K.J.	NEW MAIN TRACKS EAST OF TRAINING WALKWAYS TANK FARM. ADDED.
14	29.3.75	J.K.J.	LUB OIL MAN. TANK. HRS. ADDED.
13	3.6.75	J.K.J.	DRAWING - REVISED.
12	12.7.71	J.K.J.	DRAWING - REVISED.
11	6.10.70	J.K.J.	DRAWING - REVISED.
10	4.3.70	J.K.J.	DRAWING - REVISED.
9	4.4.69	J.K.J.	REVISION OF CONTAINER ROOM ADJACENT TO W.P. C41 ADDED. FENCE LINE SOUTH OF W.P. 3 AND 4 C41 CORRECTED.
8	10.10.68	J.M.R.	ORG. REVISED.
7	22.3.68	J.K.J.	DRAWING - REVISED.
6	14.2.66	J.K.J.	DRAWING - REVISED.
5	8.12.65	A.W.D.	DRAWING - REVISED.
4	12.11.64	J.P.	DRAWING - REVISED.
3	11/6/64	J.P.	DRAWING - REVISED.
2	7/12/64	J.P.	DRAWING - REVISED.
1	ISS	DATE	DR
		AMENDMENT	CHK. APP.

BP. REFINERY (LANDARVY) LTD		JOB No.	DR.	H.M.T.	CH.
			TR.	OS	CH.
			APP.		APP.
UNIT: ESTATE					
SECTION: PLOT PLANS & LAYOUTS					
DESCRIPTION: LAYOUT OF REFINERY NEAR WATER					
SCALE 3/4" = 100 FT		DRAWING NUMBER	02-01-133		
		DR	DRAWER NUMBER		