

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
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>						
Sum of all Types of ACM	200	300	200	200 ⁴	-	-

otes

- “-” 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

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

Land-Use Specific RBSL (mg/l)

Contaminant	Residential	Commercial	Recreational
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

Notes

"none" theoretical RBSL greater than solubility limit

Table 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 discernible in ambient air
5	Visible hydrocarbon product	Overwhelming Odour

Notes

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

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

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 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

Risk Based Screening Levels (RBSLs) and Remediation Target Concentrations (RTCs)

It should be noted that in addition to the RBSLs listed in **Tables 1 and 2** as specified in the Section 106 Agreement, Atkins has also developed Remediation Target Concentrations (RTCs). These RTCs are intended to be health protective and it has been agreed with NPTCBC that where the RTCs are more conservative than the RBSLs, then the RTCs shall take precedence. A summary of the RBSLs and RTCs is presented in **Appendix C**.

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 completed to satisfy the RAP requirements pertinent to this Phase are reported separately in RAPWCS ref. 49310747/BRRP00090/Cert 39a.

Information Sources

A summary of the information sources that the Monitor has been provided with in relation to Phase 39 is provided 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** .

Table Information Sources

<i>Ref.</i>	<i>Document Reference</i>	<i>Format</i>	<i>Title</i>	<i>Author</i>	<i>Date Received</i>
1	39991-044-785-FR1287	Report	Whole Site Investigation BP Llandarcy Refinery	URS	August 2005
2	44382742/BRRP0001	Report	BP Llandarcy Refinery Desk Study	URS	July 2007
3	5041216-REM-RPT-000216	Report	Derivation of Remediation Target Criteria (Revision 3)	Atkins	January 2010
4	5041216-REM-RPT-0001340	Report	Site Wide Open Space Validation (Revision A)	Atkins	October 2015
5	5041216-REM-TN-1363	Technical Note	Open Space Zone A (North Site Woodland Margin) Revision A	Atkins	October 2015
6	5041216-REM-TN-1384	Technical Note	Open Space Zone B (South Site Reservoir Woodland) Revision A	Atkins	October 2015
7	5041216-REM-TN-1352	Technical Note	Open Space Zone C (Western Margin Woodland) Revision A	Atkins	October 2015
8	5041216-REM-TN-1387	Technical Note	Open Space Zone D (Railhead and Upper Terrace Margins) Revision A	Atkins	October 2015
9	5041216-REM-TN-1388	Technical Note	Open Space Zone E (Upper Tank Farm) Revision A	Atkins	October 2015
10	5041216-REM-TN-1347	Technical Note	Open Space Zone F (Ancient Woodland) Revision A	Atkins	October 2015
11	5041216-REM-TN-1388	Technical Note	Open Space Zone G (Southern Margin Woodland) Revision A	Atkins	October 2015
12	5041216-REM-TN-1351	Technical Note	Open Space Zone H (Rocky Knoll) Revision A	Atkins	October 2015

Ref.	Document Reference	Format	Title	Author	Date Received
13	5041216-OSW-TN-0001493	Technical Note	Phase 39 - Responses to Monitor Comments (RFI0155)	Atkins	October 2015
14	5041216-OSW-TN-1548	Technical Note	Monitor Phase 39 – POS Zone B, Triangular Separators	Atkins	January 2016
15	5041216-REM-TN-1547	Technical Note	Monitor Phase 39 – Fire Hydrant Retention	Atkins	February 2016

Requests for Information RFIs Issued by the Monitor

The Monitor has raised one RFI in relation to Phase 39, as summarised in **Table 15**. A copy of the RFI is provided in **Appendix E**. A copy of the response received from Atkins is included in the information sources provided in **Appendix F**.

Table 15 RFIs

RFI Ref.	Title	Associated Atkins Document	Date Raised	Complete	Comments
155	Review of Atkins' Site Wide Open Space Validation Report for Monitor Phase 39	Atkins' Validation Report for Phase 39 (ref. 5041216-REM-RPT-1340)	August 2015	Yes	Updated validation report received in October 2015

DESCRIPTION OF THE REMEDIAL ACTION

The following section provides a description of the remedial action that has been carried out for the purposes of completing the Redevelopment Remediation Works in relation to Phase 39. 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 in Section 1.2.1 of this report, 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

From the information presented in Atkins' validation report (Information Source 4) it is evident that Atkins has reviewed the findings of previous site investigations and desk studies to

develop an understanding of both potential and actual contamination within Phase 39. The following is of note:

Phase 39 covers an extensive area across the former refinery and generally encompasses land that was undeveloped and not used for refinery operations. Given that Phase 39 covers such a large area, Atkins has divided the phase into eight 'zones' as follows:

- Zone A – North Site Woodland
- Zone B – South Site Reservoir Woodland
- Zone C – Western Margin Woodland
- Zone D – Railhead and Upper Terrace Margins
- Zone E – Upper Tank Farm
- Zone F – Ancient Woodland Flank
- Zone G – Southern Margin Woodland
- Zone H – Rocky Knoll

The location of each of the zones is shown on the phase boundary drawing 5041216-REM-DWG-1661 Rev P5, a copy of which is provided in **Appendi A**.

With reference to the historical maps presented in **Appendi F** a number of potential sources of contamination were identified, including pipe routes; storage tanks; and other refinery infrastructure such as oil/water separators and associated drainage infrastructure.

With regards geology, Atkins reports that the British Geological Survey Sheet for Swansea (Sheet 247) Drift Edition indicates that seven of the eight zones are underlain by Till (Diamicton) heterogeneous glacial deposits; four of the zones include peat deposits; and the entire area is underlain by Pennant Sandstones of the Hughes Member, Brithdir Member and Rhondda Member.

With regards hydrology, groundwater within Phase 39 is generally situated within the underlying sandstones which are classified as a Secondary A Aquifer, defined by the Environment Agency as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers'. Given the extensive area covered by Phase 39, the direction of groundwater flow is variable. The closest surface water features to Phase 39 are North Site Reservoir and East Bay to the north; South Site Reservoir to the northwest; South Bay, Crymlyn Bog Lagoon and West Bay to the west and the Crymlyn Bog SSSI also to the west.

Intrusive Investigations

URS carried out a number of historical site investigations on behalf of the operator of the former refinery, as reported in URS' site investigation report FR1287 (Information Source 1).

In order to supplement URS' site investigations, and also to investigate potential areas of concern identified in the desk study, Atkins undertook a series of walkover surveys across Phase 39. The findings of these surveys are presented in Atkins' validation report (Information Source 4) and the accompanying Technical Notes for each zone (Information Sources 5 to 12). The Monitor accompanied Atkins on some but not all of the walkovers.

In addition to the walkover surveys, Atkins undertook a series of intrusive investigations comprising machine excavated trial pits and shallow hand-dug pits. Ground conditions were

generally found to be consistent with the reported geology discussed above whereby the soils comprised made ground underlain with glacial soils over sandstone bedrock.

Atkins states that groundwater monitoring has also been undertaken, which has involved the collection of water samples from some of the historic boreholes situated within Phase 39. Atkins reports that no significant concerns were identified within Phase 39 and ongoing monitoring has identified a general reduction in hydrocarbon concentrations within the groundwater across the site.

Further details of the intrusive investigations carried out within each zone are presented in the following sections.

Intrusive Investigations for Zone A – North Site Woodland

Atkins reports that a total of 55 machine excavated trial pits and 14 hand-dug trial pits were excavated across Zone A between October 2014 and April 2015. The location of the trial pits is shown on Atkins' drawing no. 5041216-REM-DWG-1820 a copy of which is provided in Atkins' validation report (Information Source 5). Trial pit logs are also presented in Atkins' validation report.

Atkins reports that the maximum visual/olfactory observation, as defined in **Table** of this report, was a visual class of 4, however soils are reported to have generally been scored from 0 to 2.

Atkins reports that a total of 78 soil samples were collected from the trial pits, comprising 54 samples from shallow soils (less than 1m below ground level) and 24 samples from deep soils (greater than 1m below ground level). Atkins reports that RBSL/RTC exceedances were detected in a number of samples, generally for metals, with one exceedance for benzo(a)pyrene. The implications of these exceedances are discussed further in Section 2.4 of this report.

Atkins reports that asbestos was identified in 16 soil samples and these were scheduled for quantitative assessment. Atkins reports that the highest analysed concentration of asbestos was 0.0105% in POS007 at 0.5m below ground level. Given that the recorded highest concentration was below the RBSL for shallow recreational soils of 0.02% as stated in **Table** above, the soils were considered acceptable for retention and no further action was taken.

Intrusive Investigations for Zone B – South Site Reservoir Woodland

Atkins reports that a total of seven machine excavated trial pits and 24 hand-dug trial pits were excavated across Zone B during April 2015. The location of the trial pits is shown on Atkins' drawing no. 5041216-REM-DWG-1821 a copy of which is provided in Atkins' validation report (Information Source 6). Trial pit logs are also presented in Atkins' validation report.

Atkins reports that the maximum visual/olfactory observation, as defined in **Table** of this report, was class 2, however soils are reported to have generally been scored 0.

Atkins reports that a total of 40 soil samples were collected from the trial pits, comprising 32 samples from shallow soils and eight samples from deep soils. Atkins reports that RBSL/RTC exceedances were detected in a number of samples, generally for metals as well as three exceedance for benzo(a)pyrene. The implications of these exceedances are discussed further in Section 2.4 of this report.

Atkins reports that asbestos was identified in five soil samples and these were scheduled for quantitative assessment. Atkins reports that the highest analysed concentration of asbestos was 0.0028% in ZBHP3 at 0.5m below ground level. Given that the recorded highest concentration was below the RBSL for shallow recreational soils of 0.02% as stated in **Table** above, the soils were considered acceptable for retention and no further action was taken.

In addition to the above, Atkins also reports that samples were collected from the base of the Triangular Separator to ascertain the quality of silt contained within the individual compartments of the separator. Atkins reports that the recovered samples indicated a small number of free product droplets within a fine grey silt.

Atkins also reports that a number of historical boreholes situated near to the Triangular Separators were monitored but no free product was observed.

Intrusive Investigations for Zone C – Western Margin Woodland

Reference should be made to the accompanying RAPWCS ref. 49310747/BRRP00090/Cert 39a for details of the extensive site investigations and RAP Works that have been undertaken across Zone C. In general the intrusive investigations comprised a number of machine excavated trial pits, followed by monitoring of groundwater ingress into the excavations and monitoring sumps that were installed. A number of potential sources of contamination were identified, which the RAP Works were aimed at addressing and/or containing.

Intrusive Investigations for Zone D – Railhead and Upper Terrace Margins

Atkins reports that a total of 46 machine excavated trial pits and 3 hand-dug trial pits were excavated across Zone D between January and April 2015. The location of the trial pits is shown on Atkins' drawing no. 5041216-REM-DWG-1823 a copy of which is provided in Atkins' validation report (Information Source 8). Trial pit logs are also presented in Atkins' validation report.

Atkins reports that the maximum visual/olfactory observation, as defined in **Table** of this report, was a visual class of 5, however soils are reported to have generally been scored from 0 to 3.

Atkins reports that a total of 86 soil samples were collected from the trial pits, comprising 42 samples from shallow soils and 44 samples from deep soils. Atkins reports that RBSL/RTC exceedances were detected in a number of samples, generally for metals, with three exceedances for benzo(a)pyrene, one exceedance for dibenzo(a,h)anthracene, one exceedance for Aromatic C16-C21 and one exceedance for Aromatic C21-C35. The implications of these exceedances are discussed further in Section 2.4 of this report.

Atkins reports that asbestos was identified in 12 soil samples and these were scheduled for quantitative assessment. Atkins reports that the highest analysed concentration of asbestos was 0.177% in TPE2908 at 0.5m below ground level which exceeds the RBSL for shallow recreational soils of 0.02% as stated in **Table** above. Concentrations in all 11 other samples were found to be below the RBSL. Given the isolated nature of the exceedance and the low likelihood of human interaction given the densely vegetated nature of this part of site, the soils were considered suitable for retention and no further action was taken.

Intrusive Investigations for Zone E – Upper Tank Farm

Atkins reports that a total of 219 machine excavated trial pits were excavated across Zone E between April 2014 and April 2015. The location of the trial pits is shown on Atkins' drawing no. 5041216-REM-DWG-1824 a copy of which is provided in Atkins' validation report (Information Source 9). Trial pit logs are also presented in Atkins' validation report.

Atkins reports that the maximum visual/olfactory observation, as defined in **Table** of this report, was an olfactory class of 5, however soils are reported to have generally been scored from 0 to 2.

Atkins reports that a total of 656 soil samples were collected from the trial pits, comprising 240 samples from shallow soils and 416 samples from deep soils. Atkins reports that RBSL/RTC exceedances were detected in a number of samples, generally for metals, with one exceedance for Aromatic C21-C35, one exceedance for benzo(a)anthracene, one exceedance

for benzo(b)fluoranthene, 23 exceedances for benzo(a)pyrene and one exceedance for dibenzo(a,h)anthracene. The implications of these exceedances are discussed further in Section 2.4 of this report.

Atkins reports that asbestos was identified in 20 soil samples and these were scheduled for quantitative assessment. Atkins reports that the RBSL for shallow recreational soils of 0.02% as stated in **Table** above was exceeded in two of the samples. TPE229 had a concentration of 0.0378% at 0.2m below ground level and POS118 had a concentration of 0.036% at 0.3m below ground level. Given the relatively isolated nature of the exceedances and the low likelihood of human interaction given the densely vegetated nature of this part of site and the steep topography, the soils were considered suitable for retention and no further action was taken.

Intrusive Investigations for Zone F – Ancient Woodland Flank

Atkins reports that a total of 14 machine excavated trial pits were excavated across Zone F between March and July 2014. The location of the trial pits is shown on Atkins' drawing no. 5041216-REM-DWG-1825 a copy of which is provided in Atkins' validation report (Information Source 10). Trial pit logs are also presented in Atkins' validation report.

Atkins reports that the maximum visual/olfactory observation, as defined in **Table** of this report, was an olfactory observation of class 2. Soils are reported to have generally been scored from 0 to 2.

Atkins reports that a total of 42 soil samples were collected from the trial pits. Atkins reports that RBSL/RTC exceedances were detected in a number of samples, all for metals. The implications of these exceedances are discussed further in Section 2.4 of this report.

Asbestos was not detected in any of the soil samples that received a routine screening.

Intrusive Investigations for Zone G – Southern Margin Woodland

Atkins reports that a total of 101 machine excavated trial pits and 4 hand-dug trial pits were excavated across Zone G between July 2014 and April 2015. The location of the trial pits is shown on Atkins' drawing no. 5041216-REM-DWG-1826 a copy of which is provided in Atkins' validation report (Information Source 11). Trial pit logs are also presented in Atkins' validation report.

Atkins reports that the maximum visual/olfactory observation, as defined in **Table** of this report, was a visual class of 5, however soils are reported to have generally been scored from 0 to 2.

Atkins reports that a total of 205 soil samples were collected from the trial pits, comprising 107 samples from shallow soils and 98 samples from deep soils. Atkins reports that RBSL/RTC exceedances were detected in a number of samples, generally for metals, with four exceedances for benzo(a)pyrene. The implications of these exceedances are discussed further in Section 2.4 of this report.

Atkins reports that a separator situated near the South Gate was investigated as part of the works but no signs of hydrocarbon impacted materials or free phase oil were recorded. Given the low risk, a decision was taken to retain the structure as it is currently fed by a drainage channel.

Atkins also reports that asbestos was detected in seven samples. A quantitative assessment was undertaken on four samples which indicated the soils to be acceptable for retention at shallow depth. The remaining three samples were not scheduled for quantitative assessment because they were located within areas where the placement of soils is proposed which will result in the affected soils being at depth and therefore considered acceptable. These proposed works are discussed further in **Section** of this report.

Intrusive Investigations for Zone H – Rocky Knoll

Atkins reports that a total of 38 machine excavated trial pits were excavated across Zone H between in June 2015. The location of the trial pits is shown on Atkins' drawing no. 5041216-REM-DWG-1827 a copy of which is provided in Atkins' validation report (Information Source 12). Trial pit logs are also presented in Atkins' validation report.

Atkins reports that the maximum visual/olfactory observation, as defined in **Table** of this report, was a visual class of 1.

Atkins reports that a total of 46 soil samples were collected from the trial pits, comprising 37 samples from shallow soils and 9 samples from deep soils. Atkins reports that RBSL/RTC exceedances were detected in a number of samples, all for metals. The implications of these exceedances are discussed further in Section 2.4 of this report.

Atkins also reports that asbestos was detected in two samples but quantitative analysis was not undertaken.

Summary

In summary the Monitor is satisfied that an appropriate level of investigation has been completed in order to ascertain a sufficient understanding of contamination within Phase 39. Given the proposed intended use of Phase 39, the Monitor is satisfied that the walkover approach, coupled with trial pits in areas of concern, sufficiently addresses the requirements of the Section 106 Agreement given the likely level of risk.

Remediation Strategy

Schedule 8 of the Section 106 Agreement sets out the minimum remedial action required depending on the intended use. Given that the intended use for Phase 39 has been declared as a public open space, the minimum remedial action required, as specified in the Section 106 Agreement, is as follows:

- 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:
 - Well managed parks and public gardens;
 - More lightly managed areas where public access is encouraged;
 - Areas to which access is discouraged but occasional access and/or trespassing is possible.
- 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.

In addition to the minimum remedial action requirements outlined above, Schedule 10 of the Section 106 Agreement states that:

- 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 Final Finished Level 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.
- The final 0.5m of materials shall comprise 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 **Table** of this report.

Based on the above requirements and the findings of the site assessment discussed in Section 2.1 of this report, Atkins considered that a combination of some or all of the following works were required in order to achieve the requirements of the Section 106 Agreement:

- Fencing to restrict public access into high risk locations;
- Dense planting to discourage public access into lower risk locations;
- Construction of designated footpaths and walkways to manage public access through areas of risk;
- Placement of clean soils from 300mm to 1m thick on the existing ground where RBSL/RTC exceedances were identified. Atkins states that 300mm cover is considered appropriate to prevent members of public tracking contaminated soils into dwellings from footwear or from general recreational activities in areas of either metal or inorganic exceedances where the main exposure pathway is through ingestion, inhalation or dermal contact. Atkins states that 600mm cover is considered sufficient to avoid disturbance or intermixing of soils in higher risk areas, in line with the guidance set out in the Building Research Establishment's publication 'Cover Systems for Land Regeneration' March 2004. Placement of 1m of soils is proposed in areas of former tank bases.
- Re-profiling of soils and removal of contaminated materials in some locations;
- Removal of existing structures or fencing off;
- Ongoing monitoring of product interception trenches.

The above measures were developed on a risk-based approach with a view eliminating the source, pathway, receptor linkage by preventing members of the public from coming into contact with the source, rather than dealing with the sources of contamination. The Monitor considers this approach to be appropriate.

It should be noted that fencing measures will require ongoing routine inspections and maintenance and it is suggested that the effectiveness of planting measures in discouraging access should be reviewed on an ongoing basis.

Redevelopment Remediation works

Completed Works

The redevelopment remediation works that have been completed for Phase 39 are described in Atkins' validation report (Information Source 4) and can be summarised as follows:

- Zone A: Removal of approximately 25m³ of impacted soils from the southern bank of East Bay near to where an oil/water separator had been situated.
- Zone B: Removal of potentially impacted silts from the Triangular Separator, as described in Atkins' Technical Note 1548 (Information Source 14).
- Zone B: Removal of an above ground tank that was situated adjacent to the Triangular Separators.
- Zone C: Removal of three short sections of pipe, thought to be drainage pipes.
- Zone D: Removal of sludge from a redundant below ground separator situated to the south of South Bay which was subsequently backfilled.
- Zone E: No works undertaken.
- Zone F: No works undertaken.
- Zone G: No works undertaken.
- Zone H: No works undertaken.

The Monitor attended site and observed the works and was generally satisfied that they were being carried out appropriately and that the requirements of the Section 106 Agreement were likely to be achieved.

Outstanding Works

In addition to the above, Atkins has prepared a schedule of outstanding works that are required in order to achieve the requirements set out in Section 2.2 of this report. A copy of this schedule is provided in **Appendix 4**.

The significance of these remaining works is discussed further in the following sections.

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 specified in the Section 106 Agreement have been achieved.

Detailed Designs to Discourage Access

The Section 106 Agreement requires detailed designs to be prepared to demonstrate how access will be managed.

As discussed in Section 2.2 of this report a number of options were proposed to prevent or discourage access into the areas of concern that were identified during the intrusive investigations discussed in Section 2.1.2 of this report. The proposed options for each zone include fencing to prevent access to higher risk areas, dense planting to discourage access in lower risk areas and construction of designated footpaths and walkways to manage public access through the public open spaces. Further information regarding the design of these measures is presented in **Appendix 5**.

The Monitor is satisfied that the nature of the proposed works will achieve the requirements of the Section 106 Agreement, however as discussed in Section 2.3 of this report, the majority of these works are yet to be completed.

It is noted in Atkins' validation report (Information Source 4) that the ongoing development works are subject to a planning condition that requires security measures to be implemented at the boundary of each phase as the development progresses. These security measures typically comprise a fenced boundary along the development perimeter which serves to demarcate the developed and undeveloped areas of the site and also ensures that public access is prevented into the undeveloped areas. Under the planning condition these measures are to be retained for the duration of the works.

The Monitor is satisfied that the requirements of this planning condition will offer adequate protection until such time as the works listed in **Appendix** have been completed.

It should be noted that once the development reaches the edges of Phase 39, then it will become necessary to implement the works listed in **Appendix**. Given that the Monitor will have no formal on-going role to control subsequent works once this RRWCC is issued, it is anticipated that the completion of these works will be controlled by the Local Planning Authority.

Protection of Human Health

The Section 106 Agreement requires that the detailed designs protect human health considering the reasonably anticipatable use of the land.

As noted above, the Monitor is satisfied that the proposed works listed in **Appendix** will adequately protect human health by preventing access into the areas of concern, rather than dealing with the sources of contamination. Whilst the majority of these works are yet to be completed, the Monitor is satisfied that appropriate measures are in place to ensure the protection of human health in the interim, by the fencing off of the development as it progresses.

The Monitor is therefore satisfied that there does not appear to be a significant risk to human health as long as public access continues to be restricted.

Soil Chemical Quality

The Section 106 Agreement requires that the relevant recreational RBSLs must be achieved to an appropriate depth.

Sections 2.1.2.1 to 2.1.2.8 of this report provide details of the soil testing that was undertaken as part of the intrusive investigations across Phase 39. A number of RBSL/RTC exceedances were identified.

In some locations, impacted materials were removed from Phase 39, as detailed in Section 2.3 of this report, but in the majority of locations it is intended that the materials shall remain. In these areas a number of measures are proposed as detailed in Sections 2.2 and 2.3 of this report. As noted previously in this report the Monitor considers the proposed works to be appropriate. However, much of this work is yet to be completed.

Despite this, the Monitor is satisfied that appropriate measures are in place to restrict public access into the areas of concern in the interim period.

It should also be noted that a number of waterbodies are situated directly adjacent to Phase 39, in particular North Site Reservoir and East Bay, which are situated adjacent to Zone A, and South Site Reservoir which is located within Zone B. The phase boundaries for these water bodies correspond to the water's edge and therefore the adjacent soils are included with Phase 39.

These water bodies historically suffered from significant contamination including mobile hydrocarbons on the surface of the water, as well as hydrocarbon impacted sludge at the base of the water bodies. It is therefore likely that there would have been some impact on the adjacent soils within Phase 39.

The nature of this impact would have included an oily tide mark where hydrocarbons on the surface of the water smeared the banks. As noted in the corresponding RRWCCs and RAPWCSs for the water bodies, works were completed around the peripheries of each water body to remove impacted soils around the tide-mark. As for the extent of this impact, it is considered unlikely that the hydrocarbons would have penetrated a significant distance into the adjacent soils, given that the hydrocarbons would generally remain in the open, rather than penetrating the pore space in the soils. Furthermore, validation excavations carried out within Phase 39 did not identify significant sources of contamination, albeit it is noted that the validation trial pits are likely to have been excavated outside the impacted zone.

With regards the sludge at the base of the water bodies, this was removed as part of the RAP works, and intrusive investigations following the completion of these works indicated limited impact on the underlying or down-gradient soils.

Validation Testing

The Section 106 Agreement requires an appropriate scheme of validation testing to be undertaken.

Given that the Section 106 Agreement does not specify a validation testing frequency for public open spaces, it is necessary to determine whether or not the testing that has been carried out comprises an 'appropriate scheme of validation testing'.

Atkins' validation report provides details of the validation testing frequencies that have been achieved. In total, Atkins' recent site investigations comprised 480 machine excavated trial pits and 45 hand dug trial pits across an area of nearly 62 hectares which equates to a testing frequency of 1 per 1,175m².

Whilst the testing frequencies achieved may not be in line with other frequencies specified in the Section 106 Agreement for other intended uses, it should be noted that Phase 39 covers a large area, parts of which did not form part of the former refinery process areas. The Monitor is satisfied that Atkins has targeted the areas of potential concern and undertaken an assessment appropriate to the level of risk in each area, both in terms of the likely presence of contamination and also in terms of the risk to human health when considering how these areas will be used in the future.

In summary the Monitor is satisfied that an appropriate scheme of validation testing has been undertaken in accordance with the requirements of the Section 106 Agreement.

Removal of Existing Services

The Section 106 Agreement requires that irrespective of the Intended Use 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.

As discussed in Section 2.1.1 of this report, a number of pipelines are known to have crossed Phase 39 and these could represent potential sources of contamination.

It is understood that many of these were situated on above-ground gantries which have been removed. In addition, there were a number of buried pipelines and Atkins reports that trial pits were targeted along the routes of potential pipelines but no concerns were identified.

Atkins also reports that where buried pipework has been encountered elsewhere on the site it has been removed and chased out along the route of the pipeline to ensure that no pipelines remain. Given that remediation works have been undertaken across all phases adjacent to Phase 39, it is likely that pipelines entering Phase 39 from adjacent phases would have been identified and removed.

Nevertheless, given the nature of the site investigations it is plausible that buried services and/or pipelines could remain in situ within Phase 39. However the likely risk to Phase 39, given its intended use as a public open space, is considered to be acceptable.

As well as the process pipelines, Atkins' walkover survey also indicated the presence of a number of fire hydrants along the perimeter of the site. The hydrants are located along the southern and south-eastern boundary of the site within Zones F and G as indicated on Atkins' drawing 5041216-REM-DWG-2177 Rev P1, a copy of which is included in Atkins' technical note 1547 (Information Source 15).

Consideration was given to removing the fire hydrants and the fire main, which it is assumed also remains in situ, however access is difficult due to the presence of dense vegetation. Given that the fire main is located up-gradient of the former refinery process areas and does not cross areas of concern, it is considered unlikely that the fire main and/or the pipe surround would act as a conduit for contamination migration. Therefore the fire main and hydrants have been left in situ. The Monitor is satisfied that the fire main and hydrants do not pose a significant risk.

As noted in Section 2.1.1 of this report, much of the original site drainage infrastructure remains in situ within Phase 39, including a number of oil/water separators. One of the most notable structures is the triangular separator located in Zone B. As discussed in Section 2.1.2.2 of this report, site investigations indicated the presence of free product droplets within silt contained within the separator. Atkins reports that these silts were removed from the base of the separator as discussed in Atkins' Technical Note 1548 (Information Source 14). The Monitor is satisfied that the works appear to have been undertaken appropriately.

Given the nature of the works undertaken, the Monitor is satisfied that the structure no longer poses a significant risk in terms of residual sources of contamination, or the migration of contamination. Furthermore, with regards other drainage routes across Phase 39, surface water monitoring at strategic locations across the site suggests there is no significant cause for concern in terms of the drainage infrastructure which remains in situ.

Whilst it is evident that buried services remain in situ within Phase 39, the Monitor is satisfied that, given the work undertaken to review the historical plans, conduct walkover surveys and then undertake targeted intrusive investigations, the likely risk to Phase 39 is relatively low. In summary, the Monitor is satisfied that as far as is practicable, redundant services have been dealt with appropriately within Phase 39.

Recontamination of Soils from Groundwater

The Section 106 Agreement requires that 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 Final Finished Level 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.

As discussed in Section 2.1.2 of this report, groundwater monitoring has been undertaken by Atkins, including the sampling of some historic boreholes situated within Phase 39. Atkins states that no significant concerns were identified within Phase 39 and ongoing monitoring has identified a general reduction in hydrocarbon concentrations across the site.

However, groundwater contamination was historically a concern in Zone C, the Western Margin Woodland. Here a number of interception trenches and monitoring sumps have been installed, further details of which are provided in the RAPWCS 49310747/BRRP00090/Cert 39a which accompanies this certificate.

These measures aimed to restrict the migration of contaminated groundwater from the Western Margins into the down-gradient areas, namely Crymlyn Bog. Given the groundwater regime and the direction of flow, such matters are not considered to pose a threat to the adjacent development areas.

Elsewhere, albeit a number of RBSL/RTC exceedances were observed in soils, the majority were for less mobile contaminants, such as metals. Furthermore, given the shallow nature of the RBSL/RTC exceedances in relation to the deeper groundwater it is considered unlikely that there will be significant recontamination of soils from impacted groundwater.

With regards ochreous discharges, Atkins states that seepages are present across the site and mitigation of such discharges will be incorporated into the detailed drainage design in the long term. In the short term, such discharges will be managed via the use of shallow ditches/drains and sediment traps such as settlement ponds and hay bales. The Monitor is satisfied with this approach.

In summary the Monitor is satisfied that further recontamination of shallow soils is unlikely.

Imported Fill

The Section 106 Agreement requires that the upper 0.5m of soils shall comprise 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.

Given that there are no development proposals for Phase 39, this requirement is not considered relevant to this Phase. However it is noted that Atkins has specified the placement of clean soils from 300mm to 1m thick on the existing ground where RBSL/RTC exceedances were identified. The rationale for this approach is discussed in Section 2.2 of this report. These works are yet to be completed.

It should be noted that any such import 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 this 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.

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. **Table** provides a list of the minimum remedial action required, as described in Section 2.2 of this report, and summarises whether or not in the Monitor's professional opinion each requirement has been satisfied.

Table Certificate Summary

<i>Requirement</i>	<i>Status</i>	<i>Comments</i>
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Requirement	Status	Comments
Develop detailed designs to discourage access.	Complete	Refer to section 2.4.1
The detailed designs must be protective of human health considering the reasonably anticipatable use of the land.	Complete	Refer to section 2.4.2
The relevant RBSLs (recreational RBSLs) must be achieved to an appropriate depth.	Complete	Refer to section 2.4.3
An appropriate scheme of validation testing is required.	Complete	Refer to section 2.4.4
All buried services shall be removed and the routes of those services shall be backfilled with material no more permeable than the general material in the vicinity.	Complete	Refer to section 2.4.5
Wherever there is a risk that groundwater may contaminate soils within the top 1m, all necessary steps shall be taken to mitigate these risks.	Complete	Refer to section 2.4.6
The final 0.5m of materials shall comprise quality controlled imported fill materials suitable for the use to which they are to be put.	Not applicable	Refer to section 2.4.7

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 39.

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.

No such structures are proposed within Phase 39 and therefore this requirement is not considered to be relevant to the Phase.

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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, as well as observations made by the Monitor on site, the Monitor is satisfied that the redevelopment remediation works that have been completed to date appear to have been completed in general accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement.

It is noted however that some works remain outstanding, details of which are provided in **Appendix**. The Monitor is satisfied that these proposed works will achieve the requirements of the Section 106 Agreement, however, the Monitor recognises that the works will not be required for some time until the development extends into the areas adjacent to Phase 39. In the interim the Monitor is satisfied that an existing planning condition that requires the development boundary to be fenced will afford the necessary protection to the public. Nevertheless, it is suggested that CDL should satisfy themselves with this approach before declaring the PWCD.

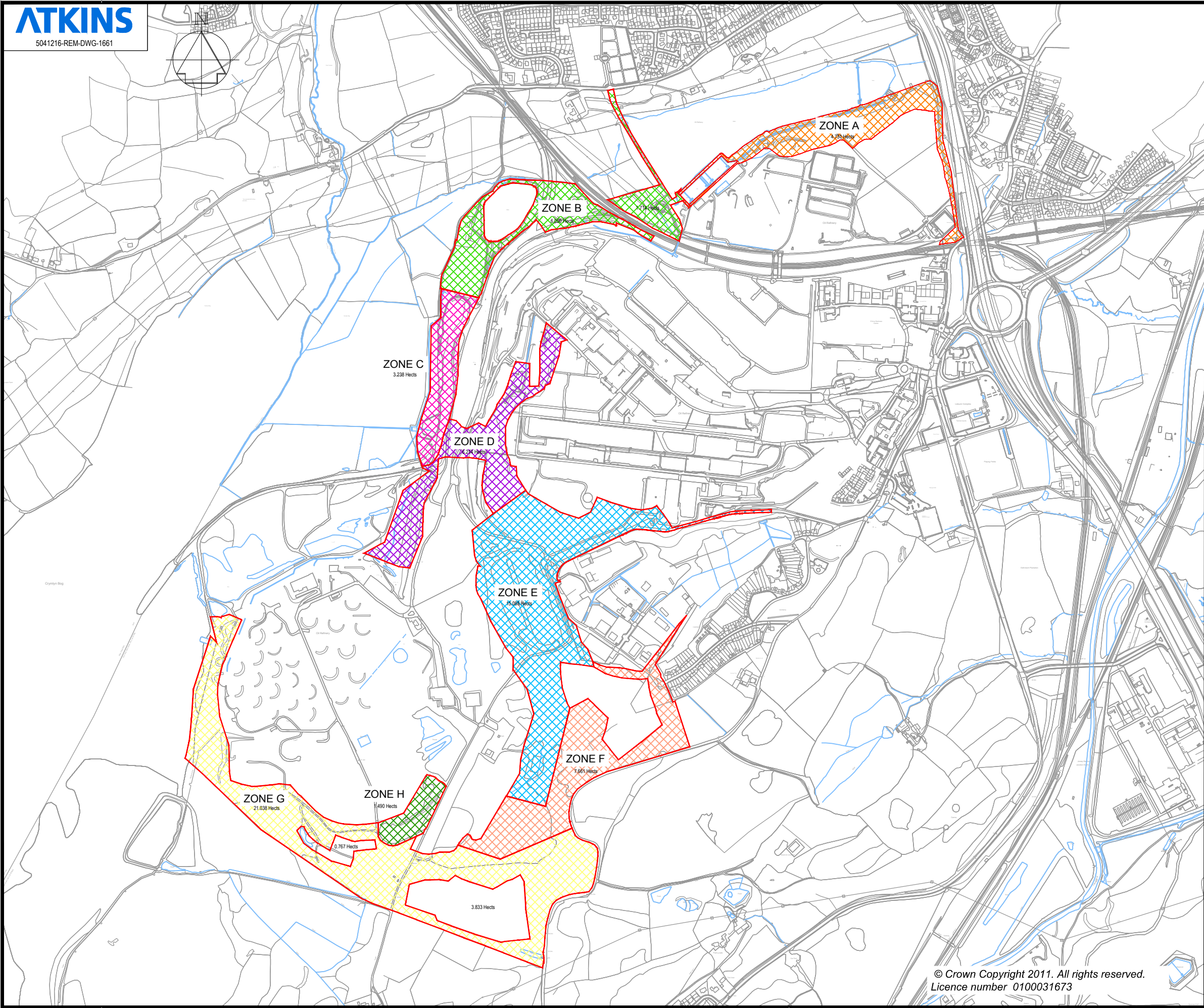
It should also be noted that if after this RRWCC has been issued it is decided to redevelop parts of Phase 39 for uses other than public open spaces, as suggested by the current masterplan, then further remediation works will be required. The scope of such works will need to be agreed with the Local Authority as the Monitor will have no formal on-going role to control subsequent works once this RRWCC has been issued.

Notwithstanding the above, the Monitor is satisfied that the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement have been met and 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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Notwithstanding the above comments, the PWCD will be declared by CDL once CDL is satisfied that the remediation necessary for the specified intended uses 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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KEY

P5	BOUNDARY AMENDMENT	MJ	MT	30.11.15
P4	BOUNDARY AMENDMENT	HS	MT	26.10.15
P3	REVISED BOUNDARIES	NR	MT	19.08.15
P2	REVISED BOUNDARIES	MB	MT	31.03.15
P1	FIRST ISSUE	MJ	MT	23.02.15

REVISIONS	Drawn By	Checked By	Date
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PURPOSE OF ISSUE	Rev.	Authorised for issue	Date
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Atkins Limited
Telford Office
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Tel 01952 201234
Fax 01952 200981

Birmingham Office
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THIS DRAWING IS NOT TO BE SCALED

CLIENT
ST.MODWEN

PROJECT
COED DARCY

DRAWING TITLE
MONITOR PHASE 39

SCALES 1:10,000	DRAWN MB	CHECKED MT	CO-ORD CHECK
	DATE 27.03.15	DATE 27.03.15	DATE

0	SHEET A3	PLOT DATE 30.11.15
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DRAWING NO 5041216-REM-DWG-1661	REV P5
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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

3rd December 2013

Our ref:

Coed Darcy Limited
Dumfries House
Dumfries Place
Cardiff
CF10 3ZF

Dear Sirs

Coed Darcy
Phase 39 - Proposed Woodland and Heathland
Request for Phase Works Completion Date

We hereby give our written request seeking the declaration of the Phase Works Completion Date for Phase 39 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 39 boundary is shown on the attached Drawing No. 5041216-REM-DWG-1661.

The "Intended Use" for Phase 39 is proposed to be woodland and heathland areas.

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

Yours faithfully

A handwritten signature in black ink, appearing to read "Neil Williams".

Neil Williams

For and on behalf of St. Modwen Developments Limited

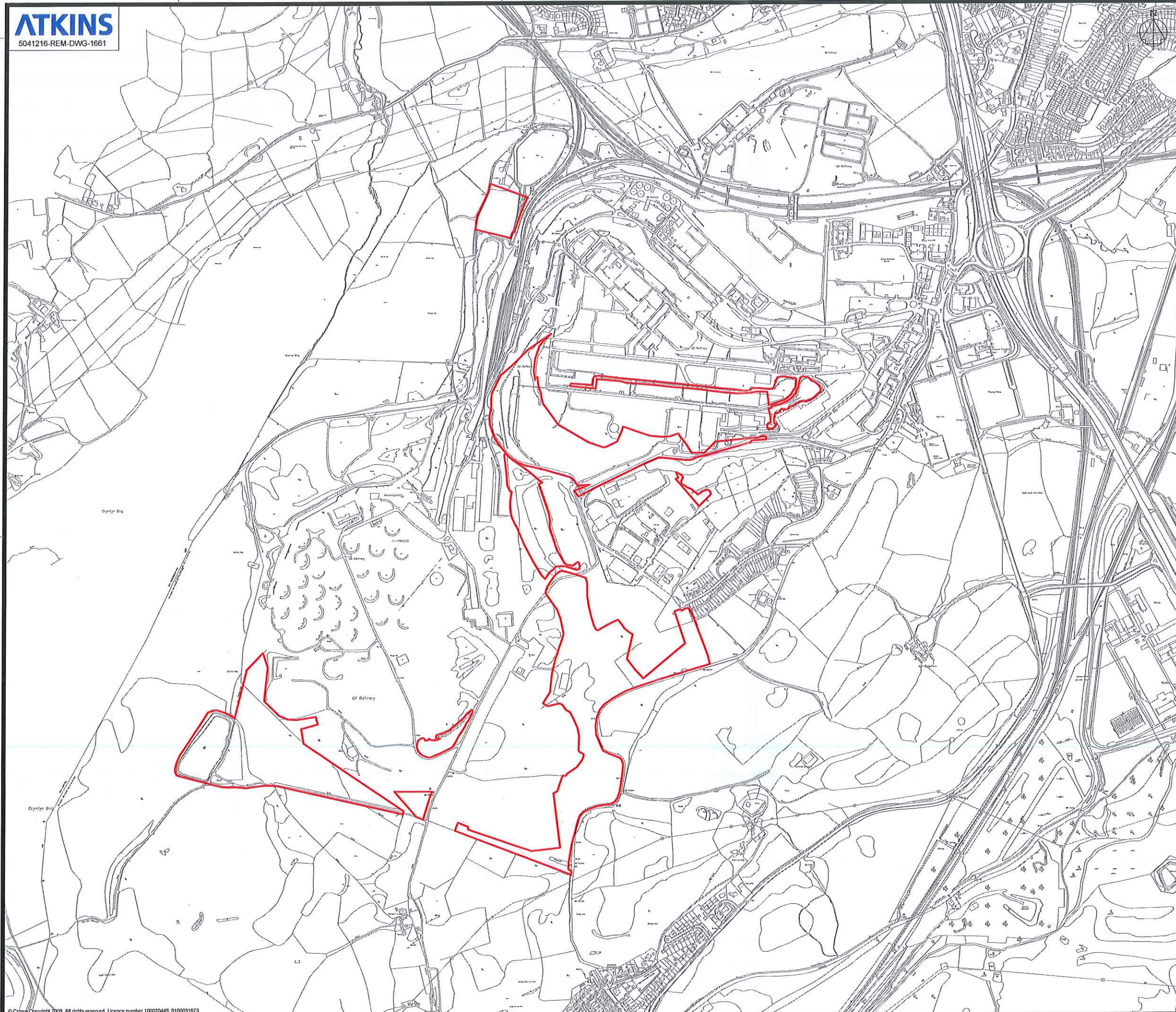
Cc Rhys Mander, Llancoed House, Coed Darcy, Neath, SA11 8AZ

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

PHASE BOUNDARIES

REVISIONS	Drawn By	Checked By	Date

PURPOSE OF ISSUE	Rev.	Authorised for Issue	Date
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Atkins Limited

Birmingham Office
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West Midlands B1 1TF

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THIS DRAWING IS NOT TO BE SCALED

CLIENT

ST.MODWEN

PROJECT

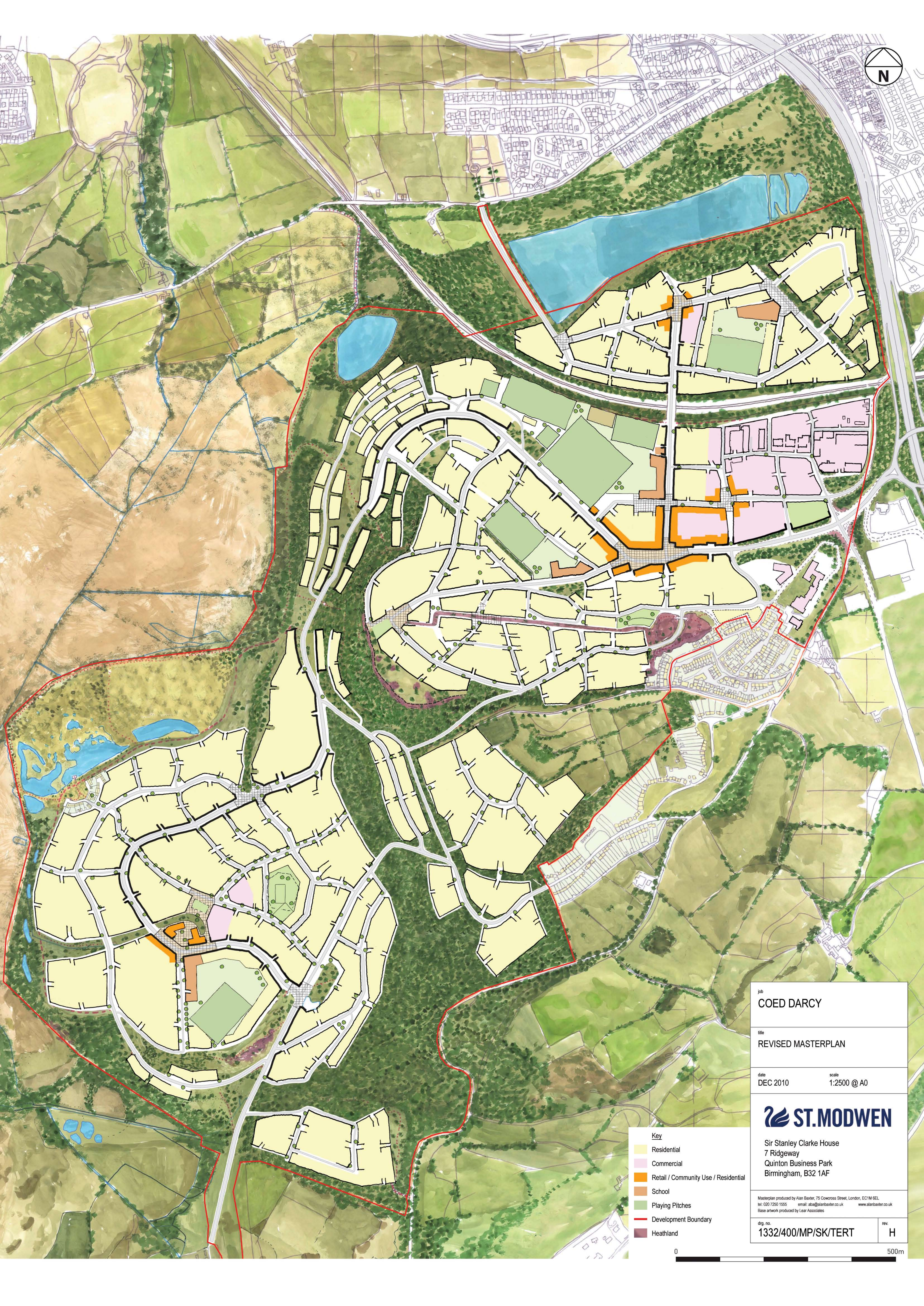
COED DARCY

DRAWING TITLE
PROPOSED PHASE BOUNDARY
MONITOR PHASE 39

Scales	DRAWN	CHECKED	CO-ORD CHECK
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	DATE	DATE	DATE
	02/12/13	02/12/13	

DRAWING NO	SHEET	PLOT DATE
5041216-REM-DWG-1661	A1	04.12.13

REV



- 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	
drp. no. 1332/400/MP/SK/TERT	rev. H



***A E I B SC E LE OF T E
SECTION 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 CO ARISO OF RBSL
A RTC T RES OL S***

4. Comparison of RBSLs and RTC

As an objective of these works was to establish whether the RBSLs were health protective, the RBSLs and RTC have been compared. This comparison is presented in the tables in this section of the report. 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 bolded ¹⁶.
- 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.

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

These further site specific modifications have not been considered at the present stage. However, information provided herein could be used to inform such an evaluation.

4.1 Comparison of residential RBSLs and RTC (shallow soil)

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

Table 4.1 – Comparison of residential RBSLs and RTC for shallow soil

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
Arsenic	6.40E+01	6.40E+01 a	6.40E+01 a	final
Chromium	1.30E+02	7.80E+01 a	7.80E+01 a	draft
Cadmium	2.60E+00	3.00E+00 b	3.00E+00 b	final
Mercury (inorganic)	1.00E+00	1.00E+00 b	1.00E+00 b	final
Nickel	5.00E+01	7.50E+01 b	7.50E+01 b	final
Selenium	3.00E+00	3.00E+00 b	3.00E+00 b	final
Lead	3.37E+02	3.37E+02 a	3.37E+02 a	final
Vanadium	4.16E+02	1.13E+02	1.15E+02	draft
Copper	4.78E+02	1.43E+02 a	1.43E+02 a	draft
Zinc	2.00E+02	4.78E+02 a	4.78E+02 a	final
Benzo(a)pyrene	9.00E-01	2.11E+00	2.42E+00	final
Benzene	1.20E-01	4.93E-02	1.92E-01	draft
Toluene	3.60E+01	8.69E+01	3.29E+02	final
Ethylbenzene	4.10E+01	3.82E+01	1.93E+02	draft
Xylene	3.20E+01	1.72E+01	1.31E+02	draft

¹⁶ In some cases there may be two RTC, where one RTC is higher and the other lower: one may be bolded and the other not and therefore they remain as draft.

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
TPH aromatic C7-C8	1.25E+02	8.69E+01	3.29E+02	draft
TPH aromatic C8-C10	9.40E+01	1.48E+01	1.03E+02	draft
TPH aromatic C10-C12	1.18E+02	5.73E+01	2.21E+02	draft
TPH aromatic C12-C16	1.31E+02	1.42E+02	4.14E+02	final
TPH aliphatic C6-C8	8.34E+03	6.98E+01	1.69E+04 *	draft
TPH aliphatic C8-C10	1.12E+02	9.76E+00	8.71E+01	draft
TPH aliphatic C10-C12	3.20E+03	1.78E+03 *	4.18E+03 *	draft
TPH aliphatic C12-C16	4.51E+03	5.10E+03 *	5.31E+03 *	final
TPH aromatic C16-C21	8.20E+01	2.72E+02	5.77E+02	final
TPH aromatic C21-C35	1.13E+03	8.88E+02	1.14E+03	draft
TPH aliphatic C16-C21	9.42E+04	1.45E+05	1.45E+05	final
TPH aliphatic C21-C35	9.48E+04			final
Total TPH (Phase 1)	1.72E+03	none (see note 9)		
Total TPH (Process Area)	2.60E+03			
Total TPH (North Tank Farm)	1.10E+03			
Total TPH (South Tank Farm)	1.02E+03			
1,2-Dichloroethane	4.00E-02	1.90E-03	1.02E-02	draft
1,1,1-Trichloroethane	1.54E+02	2.23E+00	1.73E+01	draft
Tetrachloroethene	1.10E+01	4.55E-01	3.62E+00	draft
Trichloroethene	1.00E+00	3.82E-02	3.04E-01	draft
Vinyl chloride	1.00E-02	2.02E-04	8.20E-04	draft
Dichloromethane	5.00E+00	4.58E-01	1.56E+00	draft
Cis-1,2-Dichloroethene	4.00E+00	3.93E-02	2.55E-01	draft
Trans-1,2 Dichloroethene		6.71E-02	4.64E-01	draft
Notes				
1. It is assumed that no visible free product is present within the top 1.0m of soil				
2. Metal RTC derived considering Soil Codes and background data a – based on background soil concentration b – based on Soil Code				
3. 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				
4. TPH aromatic C7-C8 is considered to comprise toluene only by Atkins				
* 5. The RTC for TPH aliphatic C10-C12 and TPH aliphatic C12-C16 for 1% sand and TPH aliphatic C6-C8, TPH aliphatic C10-C12 and TPH aliphatic C12-C16 for 3% sandy loam are based on a value produced from following the approach outlined in SR4 for substances at saturation				
6. In the S106 (Ref. 1), only one value was presented for 1,2-dichloroethene of 4 mg/kg				
7. '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.				

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
8. Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach				
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				

4.2 Comparison of residential RBSLs and RTC (deep soil)

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

Table 4.2 – Comparison of residential RBSLs and RTC for deep soil (1m 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	4.00E-01	4.60E-01	9.87E-01	final
Toluene	5.20E+01	>sat	>sat	final
Ethylbenzene	1.40E+02	2.90E+02	8.12E+02	final
Xylene	5.80E+01	9.14E+01	2.56E+02	final
TPH aromatic C7-C8	1.46E+02	>sat	>sat	final
TPH aromatic C8-C10	2.57E+02	7.10E+01	2.09E+02	draft
TPH aromatic C10-C12	1.39E+03	>sat	>sat	final
TPH aromatic C12-C16	none	>sat	>sat	final
TPH aliphatic C6-C8	none	>sat	>sat	final
TPH aliphatic C8-C10	1.58E+02	4.25E+01	1.25E+02	draft
TPH aliphatic C10-C12	none	>sat	>sat	final
TPH aliphatic C12-C16	none	>sat	>sat	final
TPH aliphatic C16-C21	none	none (see note 3)		
TPH aliphatic C21-C35	none			
TPH aromatic C16-C21	none			
TPH aromatic C21-C35	none			
Total TPH (Phase 1)	9.18E+03	none (see note 9)		
Total TPH (Process Area)	4.10E+03			
Total TPH (North Tank Farm)	3.80E+03			
Total TPH (South Tank Farm)	2.79E+03			
1,2-Dichloroethane	1.00E-01	1.11E-02	1.76E-02	draft
1,1,1-Trichloroethane	1.60E+02	1.08E+01	2.59E+01	draft
Tetrachloroethene	3.40E+01	2.30E+00	6.12E+00	draft
Trichloroethene	2.00E+00	1.88E-01	4.63E-01	draft

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sandy loam (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/final
Vinyl chloride	4.00E-02	9.30E-04	1.29E-03	draft
Dichloromethane	8.40E+01	4.19E+00	6.04E+00	draft
Cis-1,2-Dichloroethene	7.00E+00	2.06E-01	3.92E-01	draft
Trans-1,2 Dichloroethene		3.32E-01	6.89E-01	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 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 7 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				
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				

4.3 Comparison of residential RBSLs and RTC (groundwater)

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

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

Contaminant	S106 RBSL (mg/l)	RTC (mg/l)	Draft/Final
Benzo(a)pyrene	none	>sat	final
Benzene	7.00E-01	8.88E-02	draft
Toluene	4.70E+01	9.64E+01	final
Ethylbenzene	1.02E+02	1.34E+01	draft
Xylene	4.30E+01	4.10E+00	draft
TPH aromatic C7-C8	2.00E+01	9.64E+01	final
TPH aromatic C8-C10	2.20E+01	9.85E-01	draft
TPH aromatic C10-C12	none	3.87E+00	draft
TPH aromatic C12-C16	none	>sat	final
TPH aromatic C16-C21	none	none (see note 6)	final
TPH aromatic C21-C35	none		final
TPH aliphatic C6-C8	none	1.40E+00	draft

Contaminant	S106 RBSL (mg/l)	RTC (mg/l)	Draft/Final
TPH aliphatic C8-C10	none	2.96E-02	draft
TPH aliphatic C10-C12	none	2.28E-02	draft
TPH aliphatic C12-C16	none	>sat	final
TPH aliphatic C16-C21	none	none (see note 6)	final
TPH aliphatic C21-C35	none		final
1,2-Dichloroethane	2.00E-01	3.73E-02	draft
1,1,1-Trichloroethane	1.93E+02	1.31E+01	draft
Tetrachloroethene	2.20E+01	1.66E+00	draft
Trichloroethene	2.60E+00	2.22E-01	draft
Vinyl chloride	6.00E-02	2.48E-03	draft
Dichloromethane	1.50E+02	1.30E+01	draft
Cis-1,2 Dichloroethene	1.50E+01	5.47E-01	draft
Trans-1,2 Dichloroethene	1.50E+01	6.75E-01	draft
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 15 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. Additivity for TPHs and PAHs to be undertaken in line with guidance in this report			

4.4 Comparison of recreational RBSLs and parks RTC (shallow soil)

The residential RBSLs and RTC for a shallow soil source are compared in Table 4.4 below.

Table 4.4 – Comparison of recreational RBSLs and RTC for shallow soil

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
Arsenic	6.40E+01	6.40E+01 a	6.40E+01 a	final
Chromium	2.00E+02	7.80E+01 a	7.80E+01 a	draft
Cadmium	2.60E+00	3.00E+00 b	3.00E+00 b	final
Mercury (inorganic)	1.00E+00	1.00E+00 b	1.00E+00 b	final
Nickel	7.50E+01	7.50E+01 b	7.50E+01 b	final

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
Selenium	3.00E+00	3.00E+00 b	3.00E+00 b	final
Lead	3.37E+02	3.37E+02 a	3.37E+02 a	final
Vanadium	6.40E+02	3.51E+02	3.51E+02	draft
Copper	4.78E+02	1.43E+02 a	1.43E+02 a	draft
Zinc	2.00E+02	4.78E+02 a	4.78E+02 a	final
Benzo(a)pyrene	9.00E-01	2.14E+00	2.14E+00	final
Benzene	1.30E+01	2.62E+01	2.75E+01	final
Toluene	8.11E+03	2.16E+04 *	2.14E+04 *	final
Ethylbenzene	4.74E+03	9.67E+03 *	9.45E+03 *	final
Xylene	7.94E+03	1.72E+04 *	1.50E+04 *	final
TPH aromatic C7-C8	2.13E+04	2.16E+04	2.14E+04	final
TPH aromatic C8-C10	4.03E+03	2.23E+03	2.31E+03	draft
TPH aromatic C10-C12	4.59E+03	2.30E+03	2.34E+03	draft
TPH aromatic C12-C16	4.80E+03	2.33E+03	2.35E+03	draft
TPH aliphatic C6-C8	6.06E+05	2.94E+05 *	2.94E+05 *	draft
TPH aliphatic C8-C10	1.21E+04	5.88E+03 *	5.74E+03 *	draft
TPH aliphatic C10-C12	1.21E+04	5.70E+03	5.83E+03	draft
TPH aliphatic C12-C16	1.21E+04	5.80E+03	5.86E+03	draft
TPH aromatic C16-C21	3.64E+03	1.45E+03	1.45E+03	draft
TPH aromatic C21-C35	3.64E+03	1.45E+03	1.45E+03	draft
TPH aliphatic C16-C35	2.43E+05	1.59E+05	1.59E+05	draft
TPH aliphatic C21-C35	2.43E+05			draft
Total TPH (Phase 1)	9.06E+03	none (see note 10)		
Total TPH (Process Area)	1.08E+04			
Total TPH (North Tank Farm)	9.42E+03			
Total TPH (South Tank Farm)	6.35E+03			
1,2-Dichloroethane	4.50E+00	9.52E+00	1.07E+01	final
1,1,1-Trichloroethane	2.79E+04	5.80E+04 *	5.80E+04 *	final
Tetrachloroethene	6.41E+02	1.29E+03 *	1.29E+03 *	final
Trichloroethene	1.93E+02	3.79E+02	4.55E+02	final
Vinyl chloride	7.00E-01	1.29E+00	1.33E+00	final
Dichloromethane	2.41E+02	5.07E+02	5.12E+02	final
Cis-1,2-Dichloroethene	6.32E+02	3.92E+02	4.68E+02	draft
Trans-1,2 Dichloroethene	6.32E+02	1.11E+03	1.40E+03	final
Notes				
1. It is assumed that no visible free product is present within the top 1.0m of soil				

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sand (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
2. Metal RTC derived considering Soil Codes and background data a – based on background soil concentration b – based on Soil Code				
3. 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				
4. TPH aromatic C7-C8 is considered to comprise toluene only by Atkins				
* 5. The RTC for toluene, ethylbenzene, xylene, TPH aliphatic C6-C8, TPH aliphatic C8-C10, 1,1,1-trichloroethane and tetrachloroethene are based on a value produced from following the approach outlined in SR4 for substances at saturation				
6. TPH >C16 are not considered to be volatile according to TPHCWG. Consequently the inhalation of vapour pathways have not been considered				
7. In the S106 (Ref. 1), only one value was presented for 1,2-dichloroethene of 632 mg/kg				
8. '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.				
9. Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach				
10. No RTC was produced for total TPH as this will be considered further at validation stage				
11. 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				

4.5 Comparison of recreational RBSLs and parks RTC (deep soil)

The residential RBSLs and RTC for a deep soil source are compared in Table 4.5 below.

Table 4.5 – Comparison of recreational RBSLs and RTC for deep soil (1m 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	4.80E+01	4.32E+02	9.28E+02	final
Toluene	none	>sat	>sat	final
Ethylbenzene	none	>sat	>sat	final
Xylene	none	4.78E+02	1.33E+03	draft
TPH aromatic C7-C8	none	>sat	>sat	final
TPH aromatic C8-C10	none	>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

Contaminant	S106 RBSL (mg/kg)	RTC 1% Sandy loam (mg/kg)	RTC 3% Sandy loam (mg/kg)	Draft/Final
TPH aliphatic C12-C16	none	>sat	>sat	final
TPH aromatic C16-C21	none	none (see note 4)		
TPH aromatic C21-C35	none			
TPH aliphatic C16-C21	none			
TPH aliphatic C21-C35	none			
Total TPH (Phase 1)	none	none (see note 8)		
Total TPH (Process Area)	none			
Total TPH (North Tank Farm)	none			
Total TPH (South Tank Farm)	none			
1,2-Dichloroethane	6.00E+00	1.04E+02	1.66E+02	final
1,1,1-Trichloroethane	none	>sat	>sat	final
Tetrachloroethene	1.78E+03	>sat	>sat	final
Trichloroethene	2.69E+02	>sat	>sat	final
Vinyl chloride	1.60E+01	8.21E+00	1.14E+01	draft
Dichloromethane	6.22E+03	>sat	>sat	final
Cis-1,2-Dichloroethene	8.81E+02	1.92E+03	3.66E+03	final
Trans-1,2 Dichloroethene		3.10E+03	6.42E+03	final
Notes				
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 - Users must consider total exposure from all xylene isomers and not consider them in isolation. It should be noted that the value presented is the lowest of the aqueous or vapour saturation limits. The lowest saturation limit of the three isomers has been presented.				
3. TPH aromatic C7-C8 is considered to comprise toluene only by Atkins				
4. TPH >C16 are not considered to be volatile according to TPHCWG. Consequently the inhalation of vapour pathways have not been considered and therefore no value has been presented here				
5. “none” indicates theoretical RBSL greater than solubility limit				
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				
8. No RTC was produced for total TPH as this will be considered further at validation stage				
9. Asbestos has not been considered here as it is being considered in a separate report				
10. In the S106, only one value was presented for 1,2-dichloroethene of 881 mg/kg				
11. Additivity for TPHs and PAHs to be undertaken in line with guidance in this report				

A E I I FOR ATIO SO RCES

***A E I E RE ESTS FOR
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Contract Name: Coed Darcy Monitor RFI No:
Contract Number: GNP/NJR/13773-2 Date Raised: 21 August 2015
Subject: Review of Atkins' Site Wide Open Space Validation Report for Monitor Phase 39
To: Michelle Lee Atkins
Cc: Mike Poland Atkins
From: Rhys Mander AECOM

Comments

The following queries are raised in relation to Atkins' Validation Report for Phase 39 (report ref. 5041216-REM-RPT-1340):

General Comments Applicable to All Zones

- It is stated that the existing ground levels will be maintained within the final development. Please could a record of the existing ground levels be provided for future reference?
- The report states that a Conceptual Site Model has been prepared. Can this be provided?
- The report states that a joint walkover was undertaken with Atkins and the Monitor. It should be noted that the Monitor did not attend the entire walkover.
- A number of boreholes are situated within many of the zones. Have these boreholes been included in the ongoing programme of borehole monitoring, and if so have any areas of concern been identified?
- The report lists a number of validation testing frequencies that are reported to have been agreed with the Monitor. Please could you provide justification as to why these testing frequencies are considered to be appropriate – i.e. what is the rationale for proposing these frequencies and does it meet the requirements of the Section 106 Agreement in being an appropriate scheme of validation testing?
- With reference to the above, the report states that the proposed testing frequencies were not achieved for many of the zones. Whilst it is recognised that this is largely due to the inaccessibility of the areas, please provide comment as to whether or not the frequencies that have been achieved are considered to be sufficient. In particular please consider the Conceptual Site Model and also information from the desk study, such as the historical maps, to consider whether or not the site investigations that have been completed are targeted on potential areas of concern.
- Ochreous discharges have been identified at a number of locations. Please provide details of how these will be dealt with or managed.
- The report states that quantitative results for asbestos are awaited. It is understood that these results are now available. Please provide a summary of the results and discuss any concerns that have been identified.
- A number of separators and/or interceptors have been identified. If these are to remain then it is suggested that they should be investigated for the presence of hydrocarbon impacted material and then cleaned out if necessary.
- The reports identify a range of proposed works, such as the placement of clean cover, installation of fencing and planting works. It would be useful if these works could be summarised in a list. Please could a drawing also be prepared to show the locations where the works will take place, i.e. where clean cover will be placed, fencing layouts and details of the proposed planting works.
- With reference to the above, it should be noted that the Monitor may not be able to issue the RRWCC until all such works have been completed.
- With regards the placement of clean cover, please provide your rationale as to why 300mm and/or 600mm of clean cover is considered appropriate. Is this based on any modelling for example?
- Whilst the proposed works may be sufficient in terms of protecting human health, please provide further comment on the likely impact of soils and groundwater down-gradient and any measures that are proposed to address this if necessary.
- Given that the proposed planting works are aimed at restricting access, it is suggested that it may be beneficial for these works to be completed as early as possible in order for the woodland to become established prior to the occupation of adjacent residential areas.

one A North Site Woodland Margin

- With reference to drawing no. 5041216-REM-DWG-1661 it is suggested that Zone A should be extended to include the wooded area to the north of North Site Reservoir. Whilst this area falls outside of the development boundary, it falls within the property boundary as defined in the Section 106 Agreement.
- Although just outside the boundary of Zone A, it is suggested that further works are required along the southern edge of East Bay, including where the former separator was broken out. The water here is often scummy and there is various general debris along the banks as shown in the photos provided below.



one B South Site Reservoir Woodland

- With reference to drawing no. 5041216-REM-DWG-1661 it is suggested that Zone B should be extended to include the area to the west of North Site Reservoir between the dam and the railway. It is also suggested that Zone B should include the area to the north of South Site Reservoir, i.e. the triangle of land situated between the northern edge of the reservoir and the railway line. Whilst these areas fall outside of the development boundary, they fall within the property boundary as defined in the Section 106 Agreement.
- It is noted that various refinery infrastructure remains within Zone B, such as the triangular separator, the above ground storage tank next to the triangular separator, the various culverts, the separator to the north of South Site Reservoir and the North Site Reservoir pumps. Whilst it is recognised that some of these items are likely to remain in situ, it is suggested that further investigation is required in order to ascertain whether or not they pose a risk. For example the separators and culverts may contain hydrocarbon impacted material. It is also suggested that the above ground storage tank should be removed.
- During the site walkover a number of boreholes were identified within the vicinity of the triangular separator. Is Atkins able to surmise why they were installed here and have the boreholes been sampled recently?

one C Eastern Margin Woodland

- The report discusses the existing RAP features including the product interception trench, the product recovery sumps and the reed bed which, it is assumed, will be retained. There are also a number of inspection pits which remain open. It is suggested that these pits should be rationalised and where appropriate backfilled or otherwise turned into monitoring sumps. With regards the product interception trench, the free product that has been observed needs to be collected to avoid impacting the reed bed.
- The report makes reference to the existing pipes that have been noted and states that they are likely to be storm drains. It should be noted that even if they were part of the storm system it is likely that they may have contained product – hence why the separators are situated downstream. Is Atkins satisfied that the pipelines do not represent a potential source? Furthermore it should be noted that the Section 106 Agreement requires all buried services to be removed, irrespective of the proposed end-use. Has this requirement been complied with?
- Historically, the Monitor has noted free product issuing at ground level on the grassy path leading down from the bat house to the RAP trench. Given that free product that has been noted in the RAP trench and in the monitoring sumps, is it sufficient just to fence off this area?
- The report states that the existing trenches and sumps will continue to be monitored until the upslope areas have been remediated. It should be noted that the upslope areas comprise a former railway embankment

constructed of ash and clinker, the remediation of which may not be straightforward. The impact of this down-gradient is therefore likely to be ongoing for some time. How will this be managed and/or addressed?

one Railhead and pper Terrace argins

- It is noted that the historic plans show various pipe routes crossing Zone D. Also, the report states that pipework was noted during the site walkover. Given the requirement of the Section 106 Agreement to remove all buried services, will this pipework be removed? Also, have the pipe routes been investigated to check for the presence of buried pipelines?
- The report discusses an RBSL/RTC exceedance for asbestos. Is this a concern and what, if anything, will be done to address this? Consideration should be given as to whether or not this is indicative of a more widespread problem.

one E pper Tan Farm

- With reference to drawing no. 5041216-REM-DWG-1661 it is suggested that the boundary for Zone E should be amended so that it does not include the contractor's yard. From the available aerial photography this area appears to be being used for storage and stockpiling of materials. It is suggested that this area should be omitted from Zone E and dealt with along with the rest of the contractor's yard.

one F Ancient oodland

- No zone-specific comments, other than the general comments listed above.

one Southern argin oodland

- There is a lack of trial pits (presumably because of access difficulties) in the northern arm of Zone G (i.e. to the west of the Southern Tank Farm, leading up to West Bay). Historically this has been an area of concern due to its proximity to the tank farm. For example free product has previously been noted in the water bodies which now form the newt ponds on the western edge of the former refinery. Has this been addressed? The Monitor also suggests that the placement of clean cover may be advisable along this margin as it would improve the landscape and mask some of the general rubble etc.

one Roc y noll

- No zone-specific comments, other than the general comments listed above.

Date: 21 August 2015

A E I F HISTORICAL A S



ISSUE 1
~~DELETED~~ - MEDOX UNIT; POWER STA. N° 2; SUMP SEPARATORS A & B
 COOLING TOWERS A, B & C; LUB. OIL BLENDING DESPATCH PLANT;
 BOTTLED GAS DESPATCH 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, 200, 210.
 ADDED - WILKS GAS STATION; YDU PEERHEAT & COOLING TOWER;
 100 LBS. SLAG WASH ROAD WASHING GALLERY; WHITE OIL & LARG.
 RAIL LOADING GANTERIES; TANK DMI. TANKS D3, D4, D6, D7, D10,
 E9, E10; LORRY PARK.

GATE	KEY NO	RING NO	LOCATION	GATE	KEY NO	RING NO	LOCATION
1	194	1F	MAIN GATE	13	425	9F	OLD SUNBURY COMPOUND
2	208/588	2F	WEST GATE	14	335/638	10F	T.V.O. COMPOUND (B SITE GATE)
3	572	3F	EAST WALL GATE	15	1225/A122	11F	C. SITE GATE
4/5/6	A1660/529/503	4F	TRAINING CENTRE GATES	16	450/1067	12F	D. SITE GATE / PIPE TRACK / ELBA
7/8	A1397/A2544	5F	OLD PROTECT GATES	17	593	13F	FREEMANS BUND (EMERGENCY)
9	483/A2469	6F	TANK FARM GATES	18/19/20	1914	14F	RUBBISH TIP BOUNDARY GATES
10	594	7F	EMERGENCY GATE NEAR DM. STORES	21/22/23	451/2331/468	15F	RAIL HEAD GATES
11/12	568/3/A2448/A2406	8F	D.M. STORES AND COMPOUND	24	207	16F	WICKET GATE TO RAILHEAD



GATE	KEY NO	RING NO	LOCATION	GATE	KEY NO	RING NO	LOCATION
25/26	A1821/596/421	17F	TANK FARM GATE, GATE OFF CRYMMLYN	38/39/40	112/A367/A2266	24F	TENNENT CANAL PUMPHOUSE
27-28-29-30-32	A2310/602/595 A2308/609/407	18F	NORTH SITE RESERVOIR GATES	41-48	168/531	25F	A.F.R.D.
33	A1470	19F	EMERGENCY GATE TO NORTH SITE (FROM FIELD)	49/50	599/604	26F	FREEMANS BUND
34	494	20F	NORTH SITE GATE NR BOWLING GREEN	52/53	A1428/A1458	28F	COURTYARD GATES, REAR MED CENTRE
35	603	21F	WICKET GATE TO RAIL EMBANKMENT				
36	246	22F	OLD PROTECT GATE (BADGERS)				
37	1093	23F	EMERGENCY GATES, MEDICAL CENTRE				

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POS Zone	Pit ID/Area	Drawing Number	Outstanding actions
A	NSR APIs	5041216-ATK-DR-C-REM-2014	Install approximately 263m of existing fencing
B	SSR Separators 'Triangular Separators'	5041216-ATK-DR-C-REM-2015	Install approximately 128m of fencing around separators
	SSR		Install approximately 20m of fencing across the slipway down to SSR
	Tal y Fedw field		Reprofiling works to create proposed playing field.
C	Western Margin eastern boundary	5041216-ATK-DR-C-REM-2016	Install approximately 545m of fencing along eastern boundary of western margin
D	Edge of Containment Area	5041216-ATK-DR-C-REM-2017	Install approximately 350m of fencing along the toe of the railhead slope.
	Open areas within Zone D outside containment area		Placement of 300mm of clean cover for growing medium where required
	TPE2828, TPE2996, TPE2997, TPE2723, TPE2447, TPE2908, TPE2910, TPE2911, POS21, POS27, POS29		Exceedances of RBSLs requiring 600mm of clean cover in the long term. Approximately 675m ³ of clean cover required
E	Open areas within Zone E outside woodland area	5041216-ATK-DR-C-REM-2018	Placement of 300mm of clean cover for growing medium where required
	TPE179, TPE196 TP6061, TP6100, TPE154, TPE205, TPE223, TPE224, TPE228, TPE229, TPE231, TPE232, TP6063, TP6067, TPE153, TPE156, TPE197, IP3, IP070 IP477, IP027, IP91, IP103, IP142, IP143, IP173, IP197, IP209, IP210, IP211, IP404, POS036, POS040, POS043, POS056, POS069, POS084, POS104, POS108, POS118, POS123	5041216-ATK-DR-C-REM-2018	Exceedances of RBSLs requiring 600mm of clean cover in the long term. Approximately 3,325m ³ of clean cover required
F	Former tank base and bunding	5041216-ATK-DR-C-REM-2019	Regrade and place suitable soils with a thickness of 1m in footprint of tank and bunding
G	Previously developed areas within Zone G outside woodland areas	5041216-ATK-DR-C-REM-2020	Exceedances of RBSLs requiring 300mm of clean cover in the long term. Approximately 12,835m ³ of clean cover required
	TPE0791		Exceedances of RBSLs requiring 300mm of clean cover. Approximately 60m ³ of clean cover required
	South Gate Separators		Install approximately 85m of fencing around separators
H	Northern part of Rocky Knoll	5041216-ATK-DR-C-REM-2021	Scrape off soils to bedrock
	Cliff face and future heathland areas		Install approximately 545m of fencing around the site