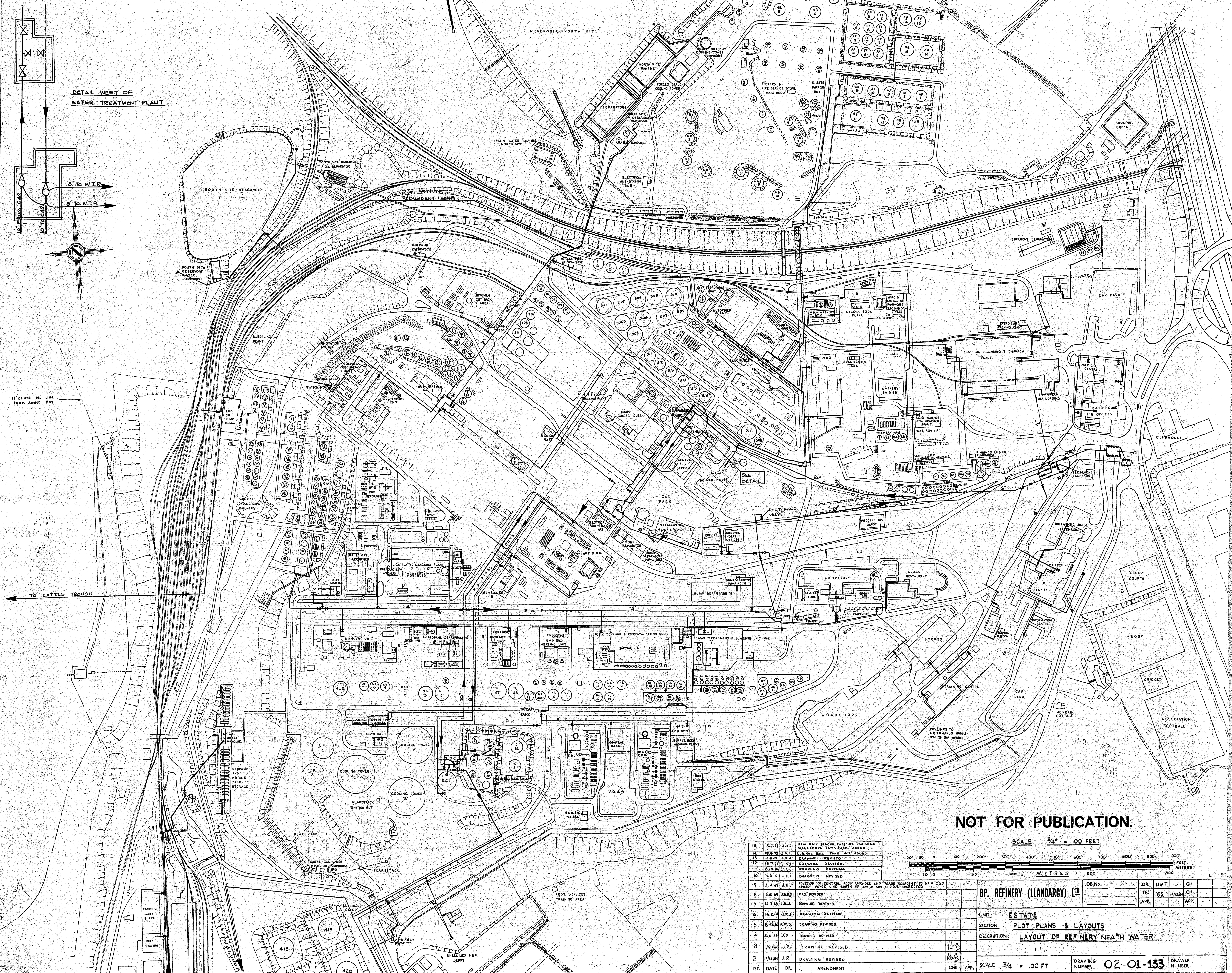




SCALE $\frac{3}{4}" = 100 \text{ FEET}$

A graphic scale bar with two rows of markings. The top row is labeled 'FEET' and has markings from 0 to 1000 in increments of 100. The bottom row is labeled 'METRES' and has markings from 0 to 300 in increments of 100. The bar is divided into alternating black and white segments.

15	3-7-73	J.K.J.	NEW RAIL TRACKS EAST OF TRAINING WILKESBORO TANK PARK. AMEND.
14	3-29-72	J.K.V.	LUB OIL DRAIN TANK NOS. ADDED.
13	3-6-72	J.K.V.	DRAWING REVISED
12	8-10-70	J.K.J.	DRAWING REVISED.
11	8-10-70	J.K.J.	DRAWING REVISED.
10	4-3-70	J.B.J.	DRAWING REVISED
9	4-4-67	J.K.J.	POSITION OF CONTROL ROAD AMENDED ADDED FENCE LINE SOUTH OF HWY 31
8	10-10-68	W.R.D.	ORG. REVISED
7	2-13-60	J.K.J.	DRAWING REVISED
6	1-2-58	J.K.J.	DRAWING REVISED.
5	5-12-55	R.W.D.	DRAWING REVISED
4	3-11-44	J.P.	DRAWING REVISED.
3	1/6/44	J.P.	DRAWING REVISED
2	7/12/44	J.P.	DRAWING REVISED
ISS.	DATE	DR.	AMENDMENT

BP. REFINERY (LLANDARGY) [1D]		JOB No.	DR.	H.M.T.	CH.
			TR.	OS	4/12/64
			APP.		APP.
UNIT: ESTATE					
SECTION: PLOT PLANS & LAYOUTS					
DESCRIPTION: LAYOUT OF REFINERY NEATH WATER					
SCALE: 3/4" = 100 FT		DRAWING NUMBER: 02-01-133		DRAWER NUMBER	

A E I F OTO RA S



Photograph No 1

24 July 2013 – Remediation excavation indicating the underlying soil profile



Photograph No 2

8 August 2013 – Remediation excavation with rainwater collecting at base



Photograph No 3

8 August 2013 – Trial pit at base of remediation excavation to confirm bedrock



Photograph No 4

8 August 2013 – Trial pits at base of remediation excavation



Photograph No 5

8 August 2013 – Proposed backfill material



Photograph No 6

8 August 2013 – Proposed backfill material



Photograph No 7

15 August 2013 – Completed remediation excavation



Photograph No 8

15 August 2013 – Completed remediation excavation



Photograph No 9

15 October 2013 – Validation trial pit following the placement of backfill materials

A E I 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				

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COED DARCY MONITOR PHASE 30 RRWCC

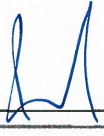
MAY 2015

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

***PREPARED BY:
AECOM Infrastructure &
Environment UK Limited***

FINAL

REV	DATE	REVISION DETAILS	PREPARED BY	CHECKED BY	APPROVED BY
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Scope

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

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

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

This RRWCC has been prepared for Phase 30 in response to the receipt of a written request from SMD pursuant to clause 4.3 of the RMA. The Phase Boundary and Intended Use on which this RRWCC is based were notified to the Monitor by letter, a copy of which is provided in **Appendix A**.

The Phase Boundary for Phase 30 is the land edged in green on drawing 5041216-REM-DRG-1564 Revision A, a copy of which is provided in **Appendix A**. The approximate location of Phase 30 in relation to the Development Boundary is shown in **Figure** below. The area of Phase 30 is approximately 28,512m².

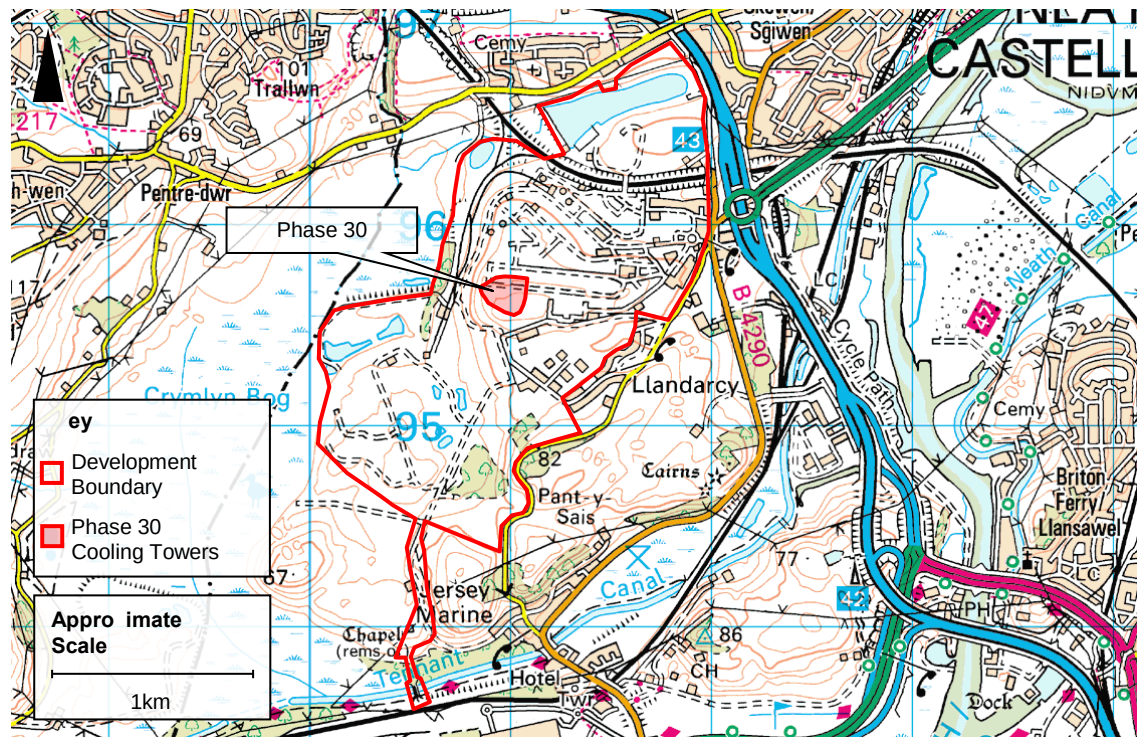


Figure Location plan

The Intended Use for Phase 30 has been declared as "residential housing with gardens and associated infrastructure". With reference to the definitions provided in the Section 106 Agreement, this is considered to comprise a residential phase.

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

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

- Describe the remedial action which in the Monitor's professional opinion has been carried out for the purposes of completing the Redevelopment Remediation Works in relation to Phase 30; and
- Certify that in the Monitor's professional opinion the Redevelopment Remediation Works have been satisfactorily completed for Phase 30 in accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement, having regard to the Intended Use.

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

Bac ground

Objectives of the Redevelopment Remediation Works

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

- The purpose and objectives of the Redevelopment Remediation Works are the carrying out of all such remedial action over and above that actually carried out as part of the RAP Works that is necessary in order to make each part of the Property suitable for its Intended Use. A part of the property will only be suitable for its Intended Use if and when the Phase Works Completion Date (PWCD) is declared in respect of that part of the Property.
- This objective will be deemed to be met for the purposes of the Section 106 Agreement and the RMA on the date specified in a notice from CDL declaring the PWCD for Phase 30. The PWCD will be declared once CDL is satisfied that the remediation necessary for the specified Intended Use for the Phase has been completed.

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

- The Developer shall carry out or procure the carrying out of all Remedial Action necessary in order to achieve the purpose and objective as outlined in Part 1 of Schedule 8 of the Section 106 Agreement. The design and specification of any remediation shall take account of the principles and objectives and the design assumptions for the RAP Works and shall not prejudice the achievement and future sustainability of these principles and objectives.
- In order to determine the need for Remedial Action in the first place it is necessary to undertake an appropriate site assessment. This assessment needs to take account of the site history, potential and/or actual measured extent of contamination and the associated implied risk. Only by developing a thorough understanding of both potential and actual contamination will it be possible to confirm that all necessary Remedial Action likely to have been completed. This obligation should be satisfied through completion of an appropriate desk study and intrusive investigation.
- The RBSLs set out in Tables 1 and 2 [in Schedule 8 of the Section 106 Agreement] and the aesthetic criteria, remediation quality and scope (including the depth below Final Finished Level (FFL) to which quality standards are achieved), as the same may be varied in accordance with this Schedule 8, shall be achieved for each part of the Property at the minimum validation frequencies set out in Clause 8 of Part 3 (as applicable depending

upon whether such part of the Property is intended for use as residential, commercial or recreational land) as a minimum base level standard.

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

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

Table Summary of Soil RBSLs

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

<i>Contaminant</i>	<i>Land-Use Specific Soil RBSL Surface to 1m below FFL (mg/kg)¹</i>			<i>Land-Use Specific RBSL Soil below 1m depth (mg/kg)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
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

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

<i>Contaminant</i>	<i>Land-Use Specific RBSL (mg/l)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
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

<i>Class</i>	<i>Visual</i>	<i>Olfactory</i>
0	No visible staining of soil, no visible suspect ACM	No detectable odour on soil
1	Occasional staining of soil, no visible suspect ACM	Faint odour on soil
2	Frequent staining of soil	Distinct but not strong odour on soil
3	Occasional heavy staining of soil	Strong odour on soil
4	Heavy staining of soil	Strong odour discernable 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

<i>Testing for the Validation Suite at the following frequency:</i>	<i>Shallow Soils (Residential <1m FFL)</i>	<i>Deeper Soils (Residential >1m below FFL)</i>	<i>Soils (Commercial all relevant depths)</i>
Imported quarried material	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples	1 per 1000m ³ ex situ, composite of 5 regular sub-samples
Imported soil from verified greenfield site	1 per 250m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples	1 per 500m ³ ex situ, composite of 5 regular sub-samples
Imported soil from characterised brownfield site ¹	1 per 25m ³ ex situ, composite of 5 sub-samples	1 per 50m ³ ex situ, composite of 5 sub-samples	1 per 100m ³ ex situ, composite of 5 sub-samples

<i>Testing for the Validation Suite at the following frequency:</i>	<i>Shallow Soils (Residential <1m FFL)</i>	<i>Deeper Soils (Residential >1m below FFL)</i>	<i>Soils (Commercial all relevant depths)</i>
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

otes

- “1” Validation suite to reflect prior use of the originating brownfield site and the design and purpose of the relevant area of Coed Darcy.
- “VO” Visual/olfactory (i.e. aesthetic) observation

Remediation Action Plan (RAP) Works

In addition to meeting the requirements of the Redevelopment Remediation Works, the Developer must also complete a series of statutory remedial works which are referred to as the RAP Works. The requirements for the RAP Works are outlined in Schedule 7 of the Section 106 Agreement.

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

Details of the scope of works and associated validation that has been completed to satisfy the RAP requirements pertinent to this Phase are reported separately in RAPWCS ref. 49310747/BRRP00072/Cert 30a.

Information Sources

A summary of the information sources that the Monitor has been provided with in relation to Phase 30 is provided below in **Table** . Unless otherwise stated, the Monitor has relied solely

on these information sources as the basis for issuing this RRWCC. Upon a review of the information sources, in the Monitor's reasonable professional opinion, such information and the manner in which it was obtained appears sufficiently up to date, reliable and robust to justify such reliance. No verification of the data has been completed by the Monitor unless noted in the following sections.

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

Table Information Sources

<i>Ref.</i>	<i>Document Reference</i>	<i>Format</i>	<i>Title</i>	<i>Author</i>	<i>Date Received</i>
1	44382742 / BRRP0001	Report	BP Llandarcy Refinery Desk Study	URS	July 2007
2	5041216-REM-RPT-000216	Report	Derivation of Remediation Target Criteria	Atkins	January 2010
3	5041216-REM-RPT-000645	Report	Geo-environmental Assessment and Outline Remediation Strategy – Proposed Persimmon Plot and Upper and Middle Terraces	Atkins	August 2011
4	5041216-PLOTS-RPT-1017	Report	Upper Terrace (Monitor Phase 30) Validation Report	Atkins	October 2014

DESCRIPTION OF REMEDIAL ACTION

The following section provides a description of the remedial action which has been carried out for the purpose of completing the Redevelopment Remediation Works in relation to Phase 30. This section of the report is structured as follows:

1. Site Assessment
2. Remediation Strategy
3. Redevelopment Remediation Works
4. Validation

Site Assessment

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

Desk Study

With reference to Atkins' remediation strategy (Information Source 3) and Atkins' validation report (Information Source 4) it is evident that Atkins has reviewed a range of information from previous site investigations and desk studies to develop an understanding of both potential and actual contamination. The following is of note:

Atkins reports that Phase 30 is situated within the central section of the former refinery, occupying the western end of an area referred to as the upper terrace. The 'terraces' were formed into an east to west trending sandstone ridge to create level platforms on which the refinery infrastructure was placed. The quarrying and terracing activities that took place are evident by the exposed rock face between the middle and upper terraces. During the redevelopment of the former refinery in the 1950s it is reported that approximately 150,000m³ of rock were removed to create the terraces.

Atkins reports that historical ground investigations, which comprised a series of trial pits, confirmed the presence of sandstone bedrock at shallow depths across Phase 30, with the maximum recorded depth to bedrock being 3.0m. Made ground was observed within the majority of the exploratory holes which generally comprised granular sands and gravels containing cobbles, boulders, brick fragments, concrete, ash and clinker with localised slag.

Atkins' remediation strategy (Information Source 3) states that chemical analysis of soil samples recovered from the trial pits indicated the presence of asbestos containing materials and elevated concentrations of metals in some locations. Where present, such contamination was confined to shallow soils.

Atkins reports that groundwater beneath Phase 30 is believed to flow generally towards Crymlyn Bog to the west. The underlying sandstones are classified as a Secondary A Aquifer supporting water supplies at a local rather than strategic scale.

With reference to the historical maps provide in **Appendi** , Phase 30 was formerly occupied by three cooling towers; the cooling towers booster pump house; an electricity substation; a number of tanks; and various pipework. A 'special process area' was declared within part of Phase 30 based on the potential for increased contamination. This was due to the presence of the electricity sub-station and the potential for PCBs to be present.

Atkins reports that there are two recorded mine entries within the vicinity of Phase 30. Further investigation, which comprised the removal of existing soils and shallow rock within the vicinity of each recorded shaft, did not identify any such features. Atkins concludes that the features either do not exist or are not situated within Phase 30 and therefore do not represent a significant risk.

Intrusive Investigations

In addition to the historic investigations discussed above, Atkins' remediation strategy (Information Source 3) indicates that two boreholes were installed within Phase 30 by Atkins in 2009. Each of the boreholes was sunk to a depth of 30m below ground level in order to investigate the possibility of mine workings beneath Phase 30.

Made ground was recorded in the boreholes to depths ranging from 0.5m to 5.0m. This was underlain by sandstone, with mudstone encountered in one of the boreholes at a depth of 21.0m. Given the absence of coal within the boreholes it was considered unlikely that coal seams that may be present in this area would have been viable for working in this vicinity.

Other than the two boreholes and the historic site investigations discussed above, no further phase-specific site investigations were undertaken. Despite this the Monitor is satisfied that sufficient intrusive investigations have been completed to develop an understanding of the site conditions prior to remediation.

Remediation Strategy

Schedule 8 of the Section 106 Agreement sets out the minimum remedial action required depending on the groundwater regime. As discussed above, groundwater in Phase 30 is primarily in rock i.e. there is little or no soil material over the bedrock and the water table is normally first encountered in bedrock. Given that the Intended Use has been declared as

residential, the minimum remedial action required for residential end-use where groundwater is primarily in rock has been applied, as defined in the Section 106 Agreement as follows:

- All oil saturated soil should be removed.
- 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.
- The aesthetic quality of soils shall be Class 1 or better for at least the first metre below FFL.
- 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.
- 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.
- 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.

Furthermore, in addition to the minimum remedial action requirements outlined above, Schedule 10 of the Section 106 Agreement sets out additional generic remedial requirements, the following of which are relevant to Phase 30:

- 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.
- To provide a minimum thickness of suitable garden soils in residential areas, soils for landscaping in public and commercial areas and sub-base for hardsurfaced areas, the Developer shall build up the final elevation after completion of the RAP and Redevelopment Remediation Works with a minimum of 0.5m of quality controlled imported fill materials suitable for the use to which they are to be put and of better quality than all RBSLs for the relevant end-use and meeting aesthetic type 0 for residential use and type 1 or better for commercial use as specified in Schedule 8 of the Section 106 Agreement. For the avoidance of doubt, the minimum remediation standards set out above therefore assume that the first half metre below Final Finished Level will comprise such imported material in all circumstances of residential and commercial end-use.

Based on the above requirements and the findings of the site assessment discussed in Section 2.1 of this report, Atkins' remediation strategy (Information Source 3) recommended the following scope of redevelopment remediation works for Phase 30 and the wider area:

- Removal of surplus soils and rock;
- Removal of oil saturated soils and/or free phase product;
- Removal of visible ash and clinker where located less than 1m below FFL;
- Removal of all soils with a visual/olfactory rating exceeding Class 2;
- Further investigation and removal of all identified asbestos contaminated materials;
- Removal of identified 'hotspots' of increased contamination as identified during the investigation to date.

In addition a range of other works was proposed in order to facilitate the subsequent redevelopment of the Phase, including:

- Removal of all remaining structural remnants, including concrete, brickwork and other identified obstructions;
- Removal of remaining live services, including drainage;
- Re-profiling of the final surface to achieve a stable, free-draining surface.

The Monitor is satisfied that the proposed remediation strategy was generally consistent with the requirements of the Section 106 Agreement.

Redevelopment Remediation works

The redevelopment remediation works that have been completed for Phase 30 are described in Atkins' validation report (Information Source 4) and can be summarised as follows:

- Demolition and removal of above ground structures and below ground structural remnants (December 2008 to February 2009);
- Ground re-profiling including the removal of remaining below ground structures (December 2012 to April 2013);
- Validation site investigation (August 2013); and
- Benching of the existing bedrock slope along the northern boundary (May 2014).

The Monitor attended site on several occasions during the redevelopment remediation works and a selection of photographs are provided in **Appendix E**.

The Monitor is satisfied that the works appear to have been carried out in accordance with the remediation strategy outlined above and the requirements of the Section 106 Agreement.

Validation

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

Removal of Oil Saturated Soils

The Section 106 Agreement requires the removal of all oil saturated soils and/or free phase product. As described in Atkins' validation report (Information Source 4) due to the shallow nature of bedrock within Phase 30, the redevelopment remediation works involved the removal of all soils across Phase 30 to expose the underlying bedrock. No soils were placed within Phase 30, so the exposed bedrock represents the finished profile.

Given the nature of the works that have been carried out and given that all soils have been removed from Phase 30, the Monitor is satisfied that all oil saturated soils appear to have been removed from Phase 30.

Soil Chemical Quality

The Section 106 Agreement requires that all soils must be remediated to meet the RBSLs for TPH, BTEX and PAHs at the relevant depth relative to FFL.

It should be noted that in addition to the RBSLs defined in the Section 106 Agreement, Atkins has also developed Remediation Target Concentrations (RTCs) in order to assess the significance of any reported contaminant concentrations. The RTCs are intended to be health protective for a low density residential end-use. It has been agreed previously with NPTCBC's Environmental Health Department that where the RTCs are numerically lower than the RBSLs, the RTCs shall be used. A summary of the RBSLs and RTCs is presented in **Appendix F**.

As described above all soils were removed from Phase 30 to expose the underlying bedrock which now represents the finished profile. Atkins reports that given the lack of soils it was not possible to collect meaningful samples and validation has therefore relied on a visual/olfactory assessment of the bedrock. The Monitor considers this approach to be appropriate. This is discussed further in section 2.4.3 of this report.

Aesthetic Quality of Soils

The Section 106 Agreement requires that the aesthetic quality of soils for at least the first metre below FFL shall be Class 1 or better (i.e. no more than a faint odour and occasional staining of soil) and that the aesthetic quality of soils at greater than 1m below FFL shall be Class 2 or better (i.e. no more than a distinct (but not strong) odour and frequent staining of soil). The aesthetic criteria are defined in **Table** .

Given that the redevelopment remediation works involved the removal of all soils across Phase 30 to expose the underlying bedrock, which now represents the finished profile, and that no soils have been placed within Phase 30, Atkins has undertaken a visual/olfactory assessment of the bedrock profile which is understood to lie 0.5m below FFL.

Atkins reports that the visual/olfactory assessment was undertaken on a 50m² grid which is broadly in line with other similar assessments on previous Phases. In addition a Photo Ionisation Detector (PID) and headspace bag were used to test samples where visual/olfactory observations of Class 1 were identified.

With reference to Atkins' drawing 5041216/REM/DWG/1714 Revision P3, a copy of which is provided in Atkins' validation report (Information Source 4), Atkins reports that a total of 134 observations were undertaken. Minor evidence of contamination up to Class 1 was identified at eight locations. Atkins reports that the PID readings at each of these eight locations recorded values of between 0.0ppm and 0.2ppm, which is not considered significant.

Given that there were no observations of Class 2 or greater, Atkins concludes that the materials are acceptable for retention within the top 1m below FFL. The Monitor concurs and is satisfied that the soils within Phase 30 meet the necessary aesthetic quality as specified in the Section 106 Agreement.

Ash, Clinker and Metals

The Section 106 Agreement requires the removal of soils where there is visible ash and clinker or metal concentrations above RBSLs, so that none is retained within the first metre below FFL in garden areas.

Whilst the historic site investigations indicated the presence of elevated concentrations of metals within Phase 30, given that the redevelopment remediation works involved the removal of all soils across Phase 30 to expose the underlying bedrock, the Monitor is satisfied that the soils within Phase 30 meet the necessary requirements for ash, clinker and metals in accordance with the Section 106 Agreement.

Groundwater

The Section 106 Agreement requires that where it is not practicable to address groundwater contamination within bedrock this must be controlled, for example where seepages, 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.

Based on the information from historic site investigations, coupled with the observations during the redevelopment remediation works, groundwater appears to lie at considerable depth within the bedrock. No seeps, sheens or iron staining is anticipated to discharge from the bedrock at surface.

The Monitor is therefore satisfied that no further control measures are required in relation to groundwater in accordance with the requirements of the Section 106 Agreement.

Asbestos

The Section 106 Agreement requires that all soil potentially containing dispersed asbestos fibres or visible asbestos containing material must be removed or remediated to meet in bulk the appropriate RBSL, or to meet the requirements of relevant Environmental Authorities, whichever is the more conservative.

It should be noted that whereas under the scenario defined in the Section 106 Agreement for a residential phase where groundwater is primarily in rock there is no minimum depth to which this requirement must be achieved, for the scenario where groundwater is in soil, the above requirement must be met to a minimum depth of 2m below FFL. On previous Phases it has been agreed that it is appropriate for this minimum depth to also apply to residential phases where groundwater is in rock.

Whilst the historic site investigations indicated the presence of asbestos within Phase 30, given that the redevelopment remediation works involved the removal of all soils across Phase 30 to expose the underlying bedrock, the Monitor is satisfied that the soils within Phase 30 meet the necessary requirements for asbestos in accordance with the Section 106 Agreement.

Buried Services

The Section 106 Agreement requires the removal of all existing buried services. Given that all soils were removed down to bedrock, the Monitor is satisfied that all existing services have been removed from within Phase 30.

Recontamination of Soils from Groundwater

The Section 106 Agreement requires that wherever there is a risk that groundwater or organic phase liquid may contaminate soils within the top one metre below FFL such that any of the relevant RBSLs and/or aesthetic criteria may be exceeded, all necessary steps shall be taken to mitigate these risks.

As noted above, based on the information from historic site investigations, coupled with the observations during the redevelopment remediation works, groundwater appears to lie at considerable depth within the bedrock. It is therefore considered unlikely that groundwater could contaminate soils within the top one metre below FFL.

Soils Within the Top Half Metre

The Section 106 Agreement requires a minimum thickness of suitable garden soils to be provided in residential areas, which shall comprise a minimum of 0.5m of quality controlled imported fill materials suitable for the use to which they are to be put and of better quality than all RBSLs for the relevant end-use and meeting aesthetic type 0 for residential use.

As noted above, the finished ground profile following the completion of the remediation works is reported to be FFL minus 0.5m, such that the minimum of 0.5m of clean cover is yet to be placed.

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

The as-built ground levels following completion of the remediation works are shown on Atkins drawing 5041216/REM/DWG/1635 Revision A a copy of which is provided in **Appendix C** (Information Source 4).

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.

With reference to the minimum remedial action required, as discussed in Section 2.2 of this report, **Table 1** provides a summary of whether or not in the Monitor's professional opinion these objectives have been satisfied.

Table 1 Certificate Summary

REQUIREMENT	STATUS	COMMENTS
All oil saturated soil should be removed.	Complete	Refer to Section 2.4.1
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.	Complete	Refer to Section 2.4.2
The aesthetic quality of soils shall be Class 1 or better for at least the first metre below FFL.	Complete	Refer to Section 2.4.3

REQUIREMENT	STATUS	COMMENTS
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.	Complete	Refer to Section 2.4.4
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.	Complete	Refer to Section 2.4.5
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.	Complete	Refer to Section 2.4.6
All existing 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 2.4.7
Wherever there is a risk that groundwater or organic phase liquid may contaminate soils within the top one metre below FFL such that any of the relevant RBSLs and/or aesthetic criteria may be exceeded, all necessary steps shall be taken to mitigate these risks.	Complete	Refer to Section 2.4.8
A minimum thickness of suitable garden soils shall be provided in residential areas, soils for landscaping in public and commercial areas and sub-base for hard surfaced areas. The Developer shall build up the final elevation with a minimum of 0.5m of quality controlled imported fill materials suitable for the use to which they are to be put and of better quality than all RBSLs for the relevant end-use and meeting aesthetic type 0 for residential use and type 1 or better for commercial use.	Not complete	Refer to Section 2.4.9 Placement of the final 0.5m of clean cover is yet to be completed. The placement of this material will be controlled by the Local Planning Authority.

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 30.

Ground Gas

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

Atkins' remediation strategy (Information Source 3) states that a total of 20 gas monitoring visits were undertaken by Atkins across the upper and middle terraces between January 2009 and August 2011. It is not clear whether or not any of the monitoring locations are situated within Phase 30, but it has been assumed that the findings are likely to be applicable to Phase 30 nonetheless.

Atkins reports that in general the recorded concentrations of both carbon dioxide and methane were low. Adopting a conservative approach by considering the maximum recorded concentrations and flow rates during the monitoring period, Atkins concludes that the recorded data is representative of Characteristic Situation 2 (low risk classification) in accordance with the modified Wilson & Card classification method presented in CIRIA C665.

Based on this assessment Atkins recommends the following gas protective measures:

- Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 2000g DPM and underfloor venting;
- Beam and block or pre-cast concrete and 2000g DPM/reinforced gas membrane and underfloor venting; and
- All joints and penetrations to be sealed.

Atkins also recommends that the exact details of the proposed gas protection system should be agreed with the Monitor and relevant regulatory authorities prior to installation.

As discussed above, the Monitor shall, if requested by CDL, review any certificate or other documentation purporting to confirm that Preventative Measures have been completed or are not required.

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This RRWCC confirms that in the Monitor's professional opinion, and on the basis of the information provided within the Information Sources and observations made by the Monitor during the remediation works, the Monitor is satisfied that the Phase 30 redevelopment remediation works appear to have been completed in general accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement, having regard to the specified Intended Uses, and that the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement are likely to continue to be met for the foreseeable future without the need for further remedial action in relation to or affecting the area within the Phase Boundary.

C

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

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ST. MODWEN DEVELOPMENTS LIMITED - a ST. MODWEN company

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

12th November 2013
Our ref: SLS/NW/2258

Coed Darcy Limited
Dumfries House
Dumfries Place
Cardiff
CF10 3ZF

Dear Sirs

**Coed Darcy
Phase 30 - Former Cooling Towers
Request for Phase Works Completion Date**

We hereby give our written request seeking the declaration of the Phase Works Completion Date for Phase 30 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 30 boundary is shown on the attached Drawing No. 5041216-REM-DWG-1564.

The "Intended Use" for Phase 30 is confirmed as that of residential housing with gardens and associated infrastructure.

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

Yours faithfully

Neil Williams

For and on behalf of St. Modwen Developments Limited

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

St. Modwen Properties PLC

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ATKINS

5041216-REM-DRG-1564



Key

Monitor Phase Boundary

REVISIONS	Drawn By	Checked By	Date

PURPOSE OF ISSUE	Rev.	Authorized for Issue	Date

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THIS DRAWING IS NOT TO BE SCALED

CLIENT **ST.MODWEN**

PROJECT **COED DARCY**

DRAWING TITLE **PROPOSED PHASE BOUNDARY
MONITOR PHASE 30**

SCALES	DRAWN	CHECKED	CO-ORD CHECK
1:1250	MJ	ML	
	DATE	DATE	DATE
	22.07.13	22.07.13	

DRAWING NO	SHEET	PLOT DATE	REV
5041216-REM-DRG-1564	A3	22.07.13	

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