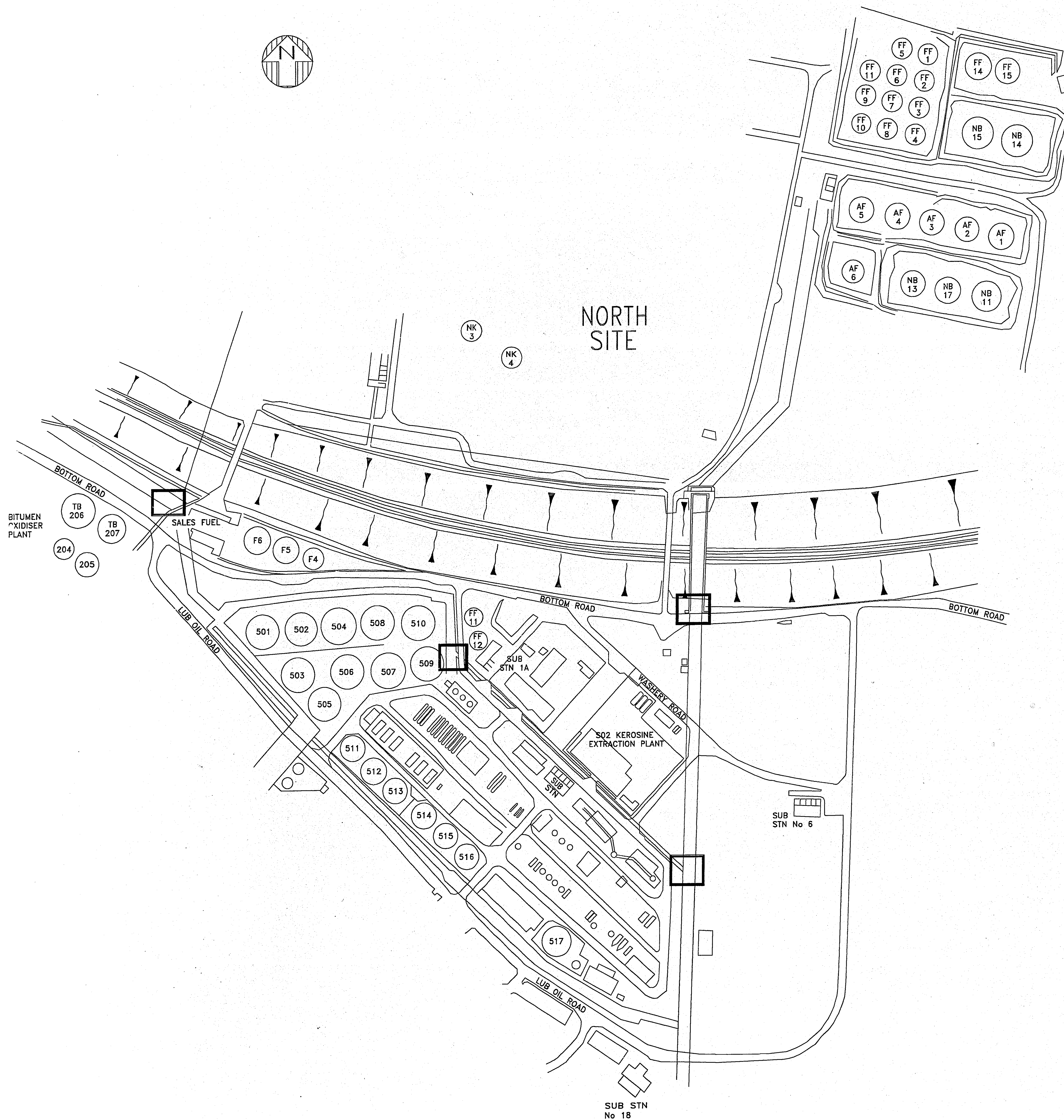
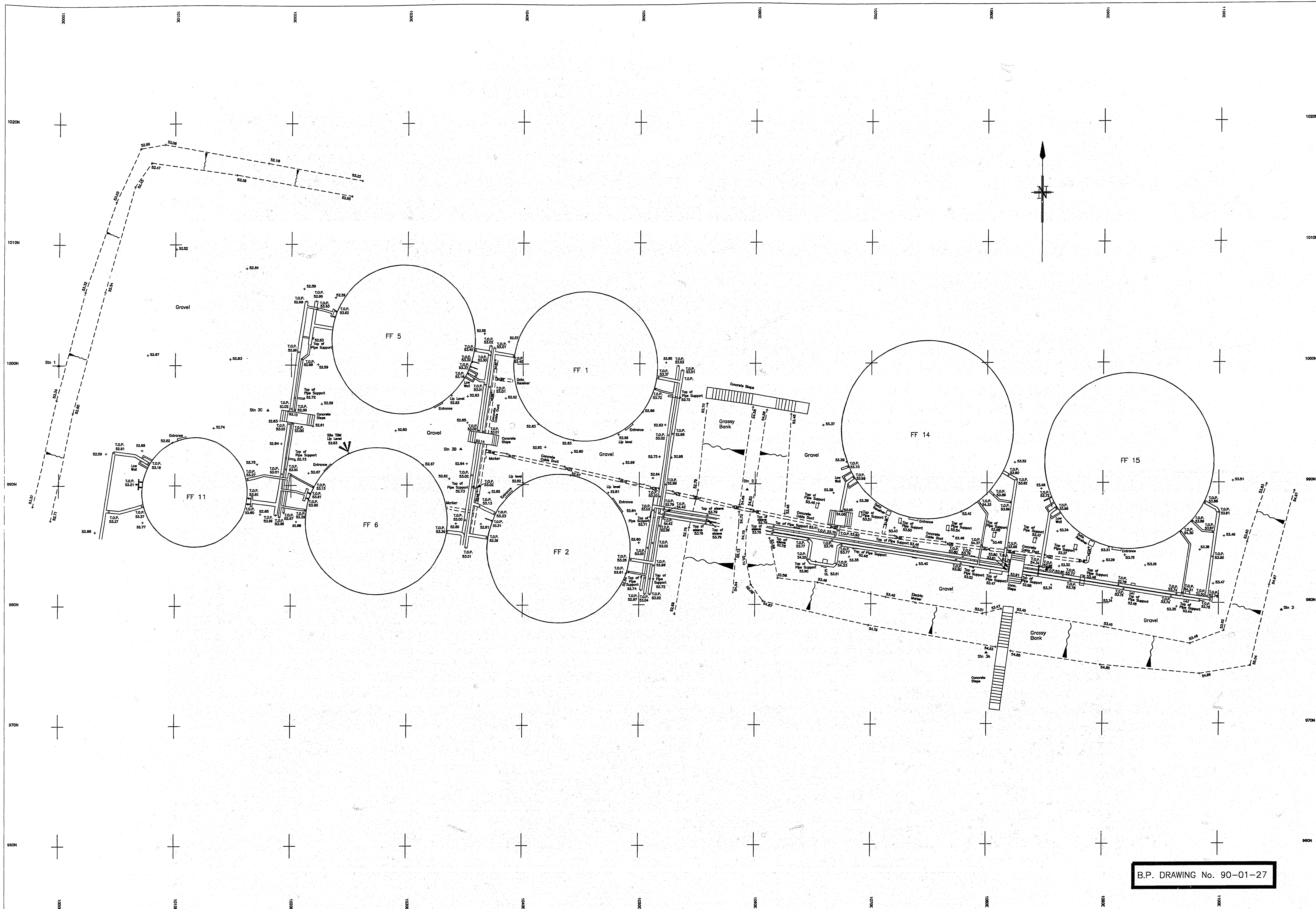




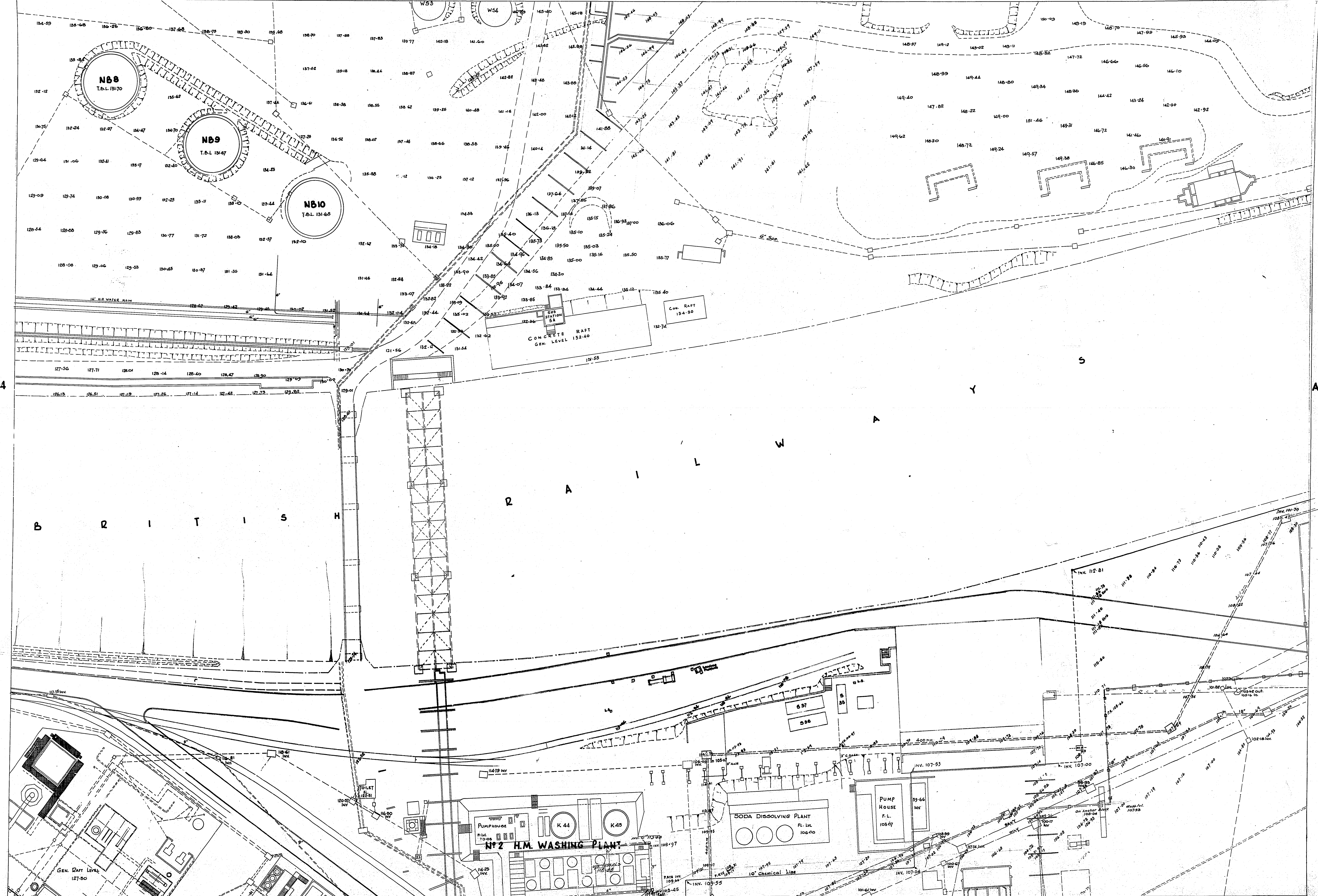
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REV	DATE	DRN	DESCRIPTION	CHK	APP
			CONSTRUCTION		
			TENDER		
			DESIGN APPROVAL		
			PURPOSE OF ISSUE	REVISION	DATE
			DESIGN CERTIFICATE No.		
BP OIL LLANDARCY REFINERY LTD.					
LOCATION			JOB No.		
SUBJECT			REFINERY GENERAL		
DESCRIPTION			PLOT PLANS & LAYOUTS		
DRN			REFINERY	SCALE	A1
CHK			DRAWING No.		
APP	1:1250		REV.		02-01-50 REV.6



B.P. DRAWING No. 90-01-27

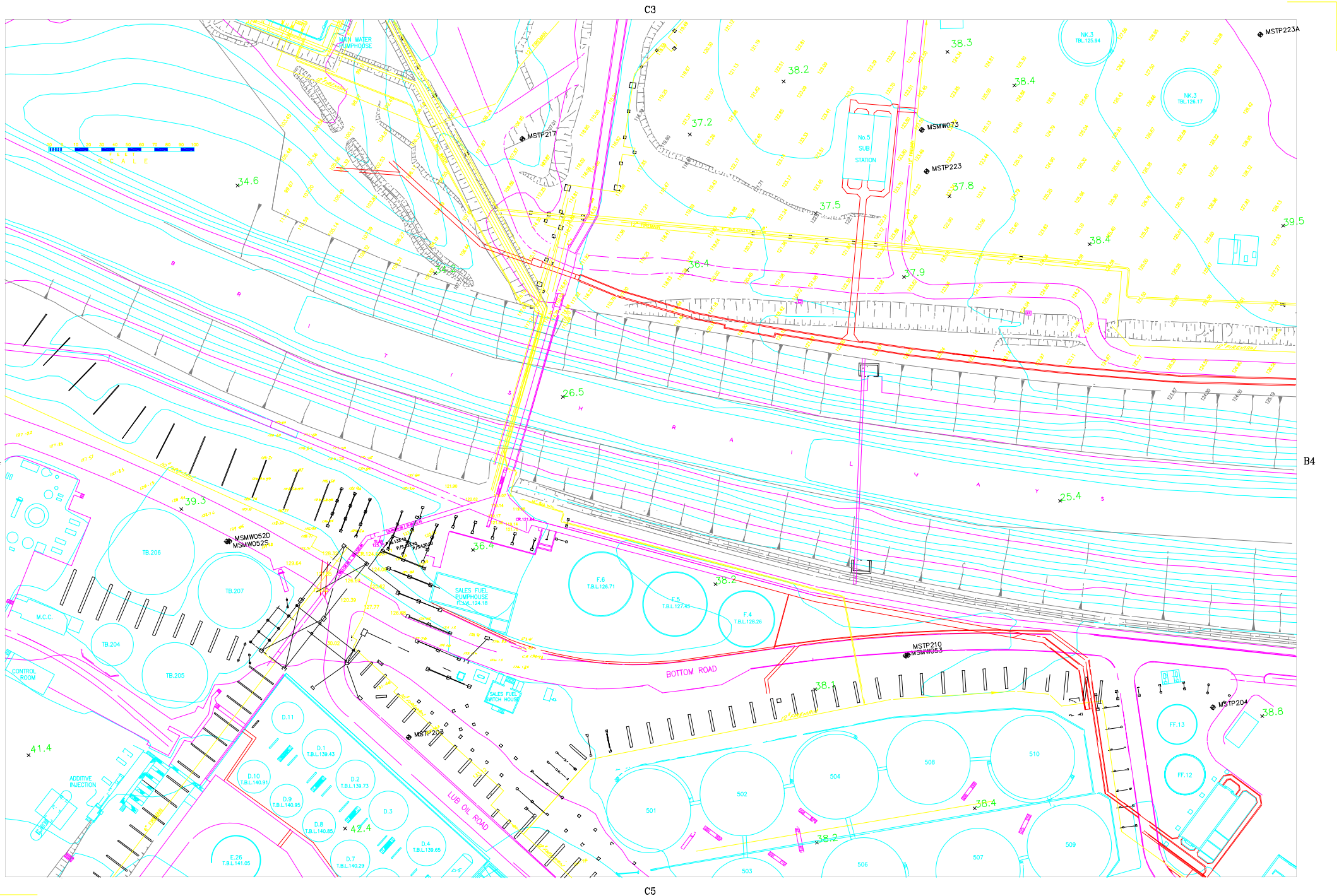
LINE TYPES Buildings Kerbs Fences Top of banks Bottom of banks Centre of bridges Overhead Wires Surface Change	NOTES 1. TBM used - lip level at foot of Tank FF6=52.825m. 2. Local grid used. 3. North arrow indicates approximate true North. 4. T.O.P. = Top of Pipe.	CLIENT BP Llandarcy Britannic House Llandarcy Neath West Glamorgan.	TANKS AT NORTH SITE , LLLANDARCY survey of site	SHEET DIAGRAM One sheet only.	SCALE 1:100 SHEET 1 OF 1 SHEET SET JOB NUMBER 2812 DRAWN LSS CHECKED APPROVED DATE Oct. 1993	12 London Rd., Neath, West Glamorgan. SA11 1EB Tel (0639) 637801/630832 Fax (0639) 637844 CONTRACT SURVEYS LTD. LAND AND ENGINEERING SURVEYORS Member of U.K. Land and Hydrographic Survey Association
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REV	DATE	AMENDMENTS
1	12-88	LEVELS UPDATED TO NEWLYN
2	12-88	DELETED FERGUSON STANKS T. 24, 35 & 36 ADDED BITUMEN PLANT & TANKS D3, 4, 5, 7 & 11 FERGUSON ROUTE UPDATED
3	12-88	ADDITIVE INJECTION ADDED



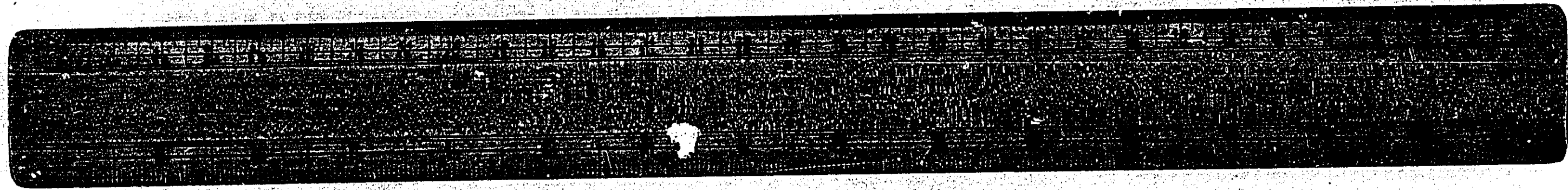


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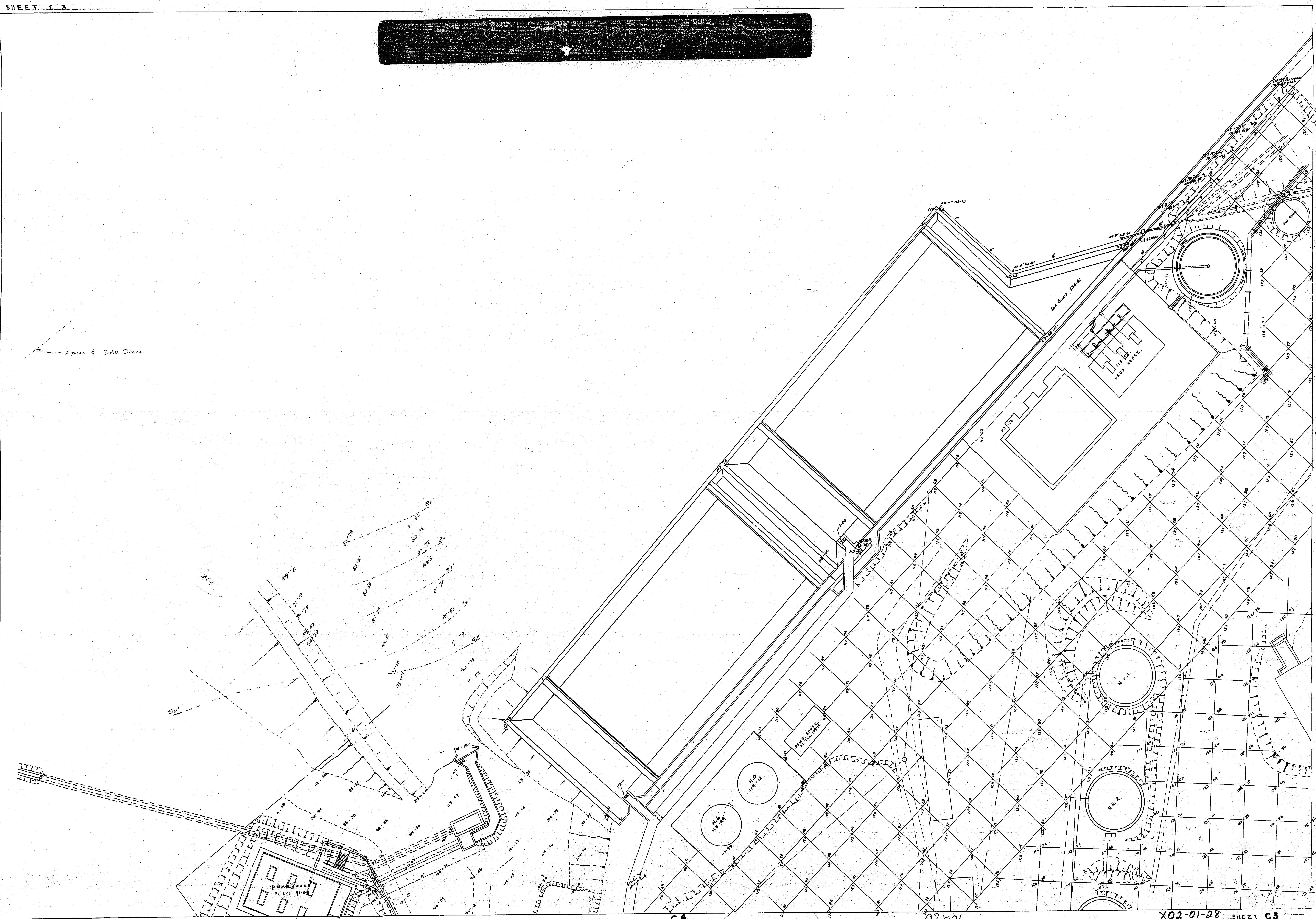
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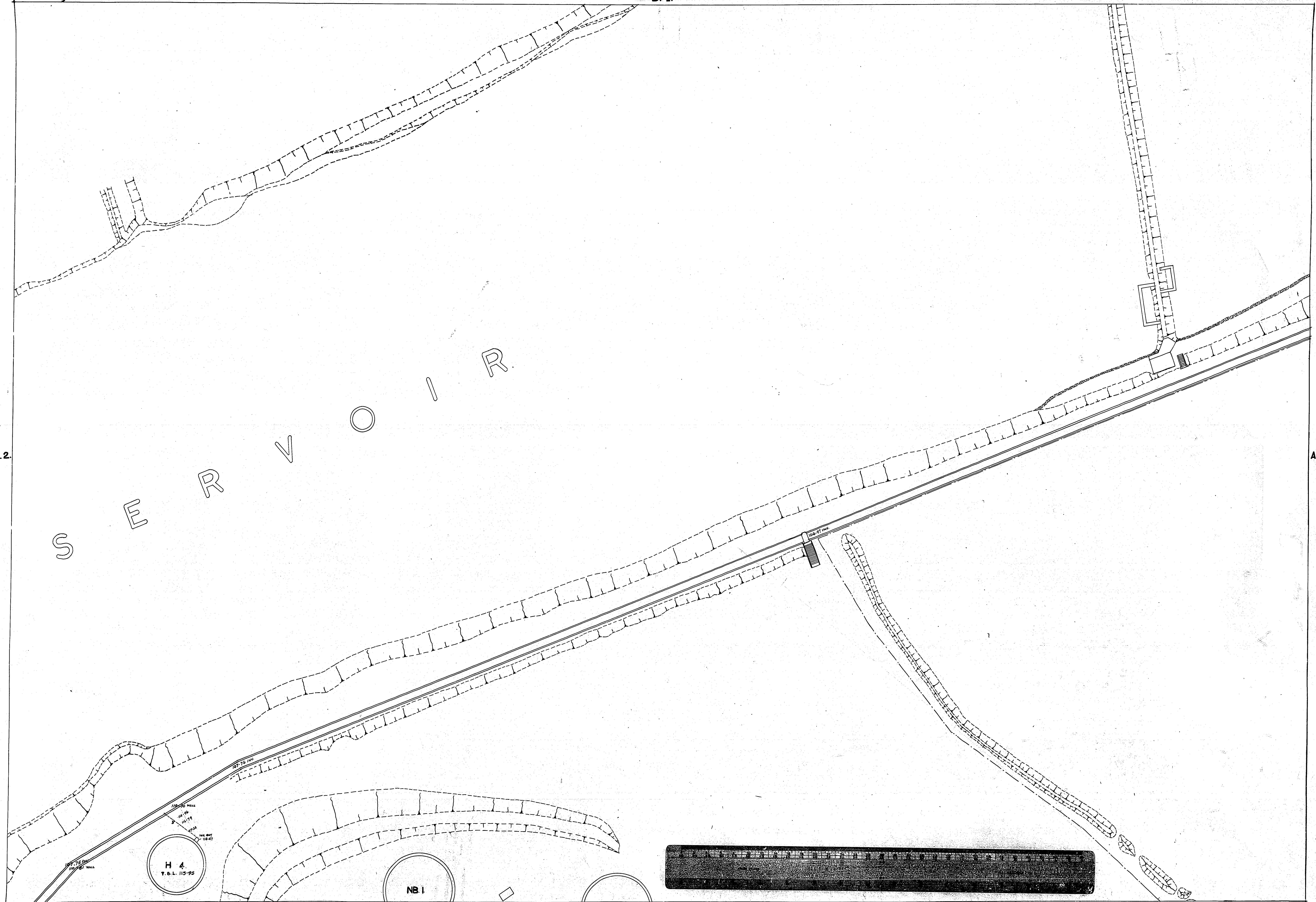
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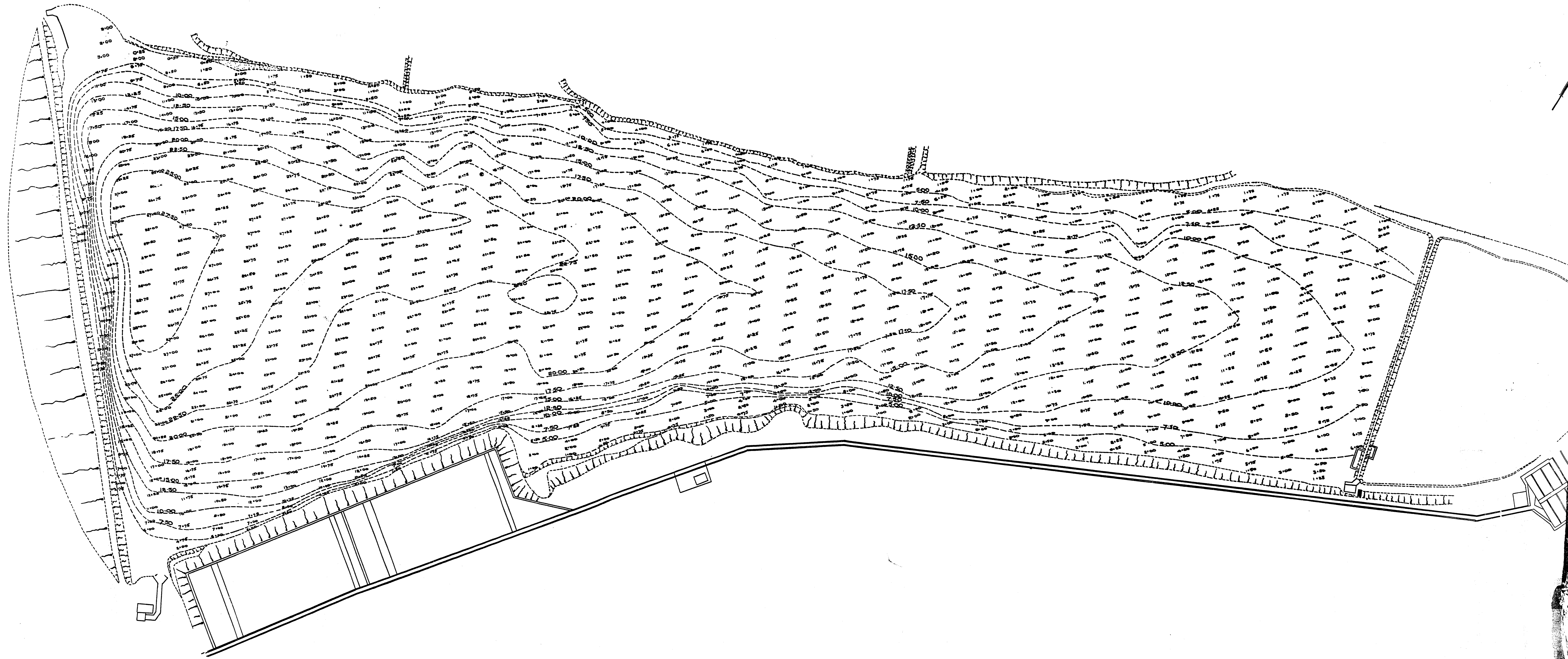
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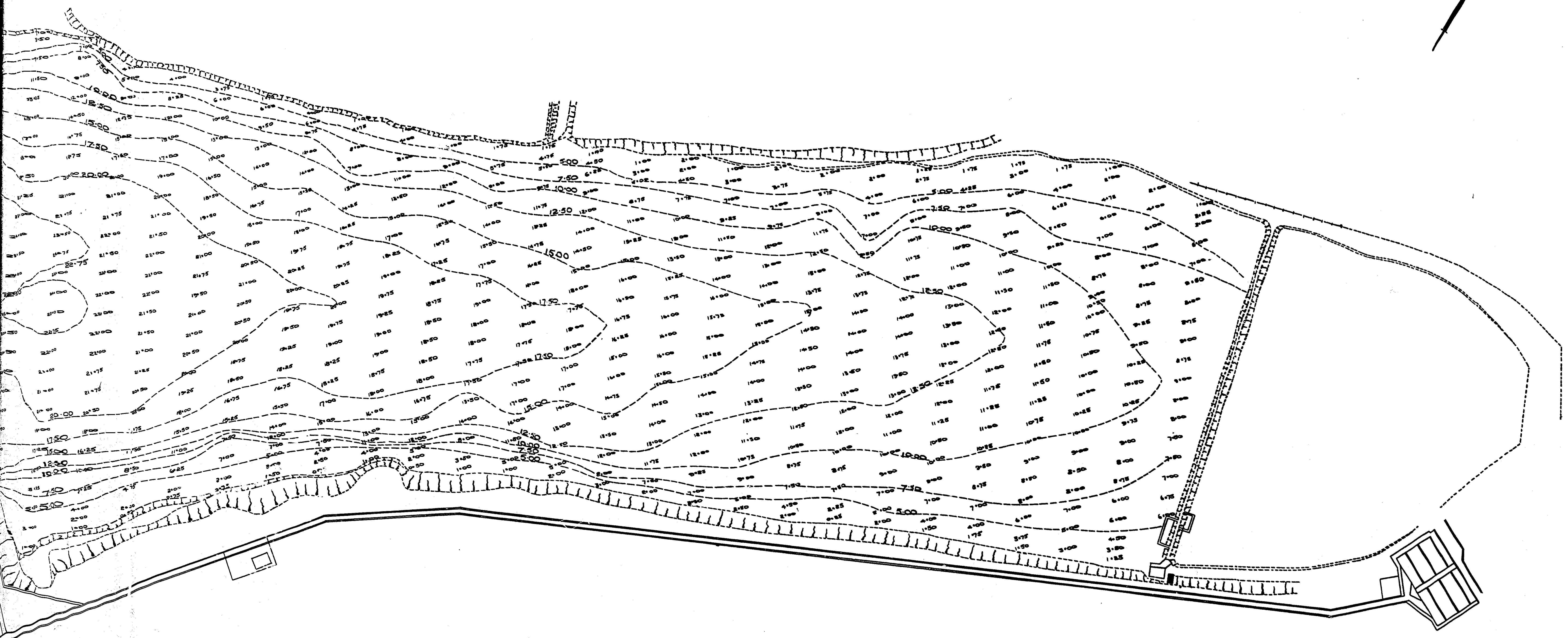
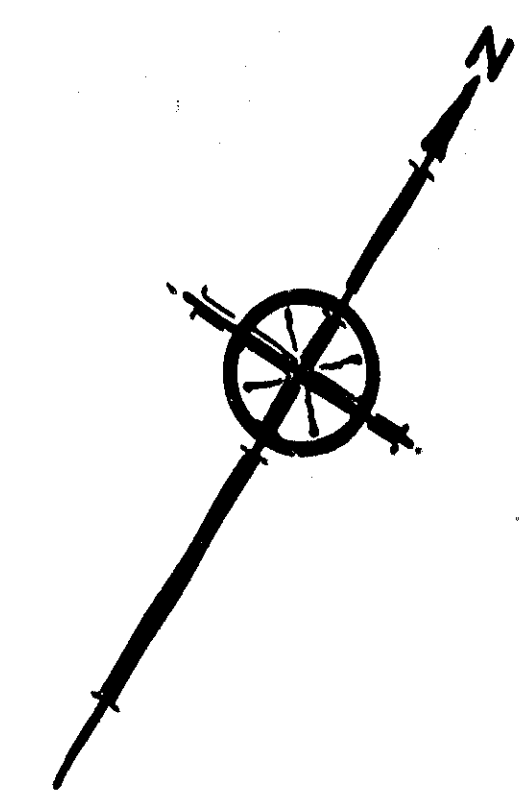


Approved: J. DAN. DUNN









NOTE.			
WATER LEVEL 29.53			
4			
3			
2			
DATE	DR.	AMENDMENT	CHKD. APP.
BP REFINERY (LLANDARCY) LTD.			
DEPTH SOUNDINGS NORTH			
SITE RESERVOIR.			
SCALE, 1" = 50'-0"		DWG. NO. 28427	
DATE, NOV. 1953.			
DR. W.A.G.	CH. J.K.	APP. W.	TR. D.H.

X90-01-12

*A E I F TO O RA ICAL
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RE E IATIO OR S*

A E I CO ARISO OF RBSL A RTC T RES OL S

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

4. Comparison of RBSLs and RTC

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

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

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

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

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

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

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

4.1 Comparison of commercial RBSLs and RTC (shallow soil)

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

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

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

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

4.2 Comparison of commercial RBSLs and RTC (deep soil)

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

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

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

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

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

4.3 Comparison of commercial RBSLs and RTC (groundwater)

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

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

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

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

5. Conclusions and Recommendations

5.1 Commercial RTC

5.1.1 Conclusions

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

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

5.1.2 Recommendations

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

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

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

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

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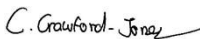
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Coed Darcy Monitor Phase 57 RRWCC

**Prepared for:
Coed Darcy Limited**

**Prepared by:
AECOM Infrastructure & Environment UK Limited**

Rev	Date	Revision Details	Prepared by	Checked by	Approved by
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1. INTRODUCTION

1.1 Scope

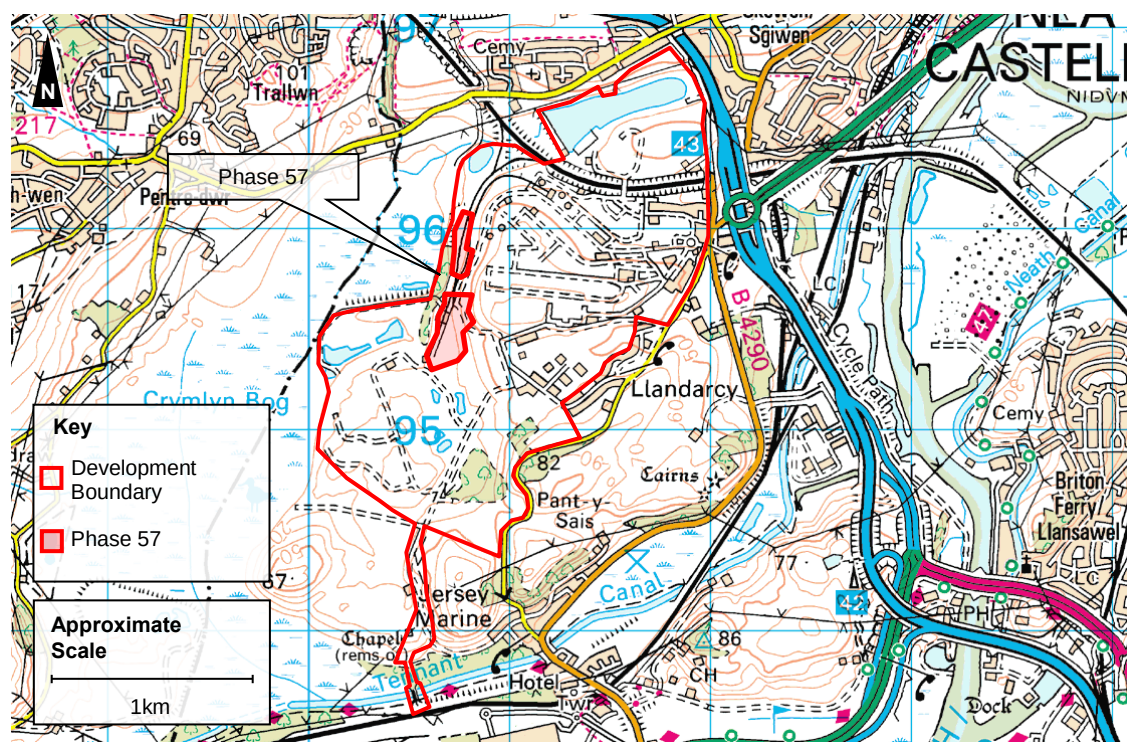
This Redevelopment Remediation Works Completion Certificate (RRWCC) has been prepared with reference to the following agreements:

- 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 57 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 have been notified to the Monitor by letter, a copy of which is provided in **Appendix A**.

The intended use for Phase 57 has been declared as public open space. The phase boundary is the land edged red on drawing 5041216-REM-DWG-1963 Rev P1, a copy of which is provided in **Appendix A**. The approximate location of Phase 57 in relation to the Development Boundary is shown in **Figure 1** below. Phase 57 covers an area of approximately 73,400m².



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Figure 1 – Location plan

It is understood that Phase 57 shall remain undeveloped as a public open space. This differs from the development layout shown on the current masterplan drawing reference 1332/400/MP/SK/TERT Revision H, a copy of which is provided in **Appendix A**, which

indicates that the area occupied by Phase 57 was originally intended for residential development.

Under the Monitor's Deed of Appointment, the Monitor is obliged to certify each phase against whichever intended use is declared by the developer, irrespective of what is shown on the masterplan. It should be noted however that further remediation works would be required if the phase was to be developed for residential use in the future.

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 57; and
- Certify that in the Monitor's professional opinion the Redevelopment Remediation Works have been satisfactorily completed for Phase 57 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 **Appendix B**.

1.2 Background

1.2.1 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 the Phase. 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 Risk Based Screening Levels (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 Ltd. 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 1 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

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

Notes

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

Table 2 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

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 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 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 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

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 site1	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

1.2.2 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**.

1.2.3 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/BRRP00130/Cert 57a.

1.3

Information Sources

A summary of the information sources that the Monitor has been provided with in relation to Phase 57 is provided in **Table 5**. 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 D**.

Table 5 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 Concentrations (RTC) (Revision 3)	Atkins	January 2010
4	5041216-OSW-TN-0001488	Technical Note	Phase 57 – Response to Monitor Comments (RFI0147)	Atkins	October 2015
5	5041216-OSW-RPT-0001407	Report	Validation Report Monitor Phase 57	Atkins	October 2015

1.4 Requests for Information (RFIs) Issued by the Monitor

The Monitor has raised one RFI in relation to Phase 57, as summarised in **Table 6**. 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 D**.

Table 6 RFIs

<i>RFI Ref.</i>	<i>Title</i>	<i>Associated Atkins Document</i>	<i>Date Raised</i>	<i>Complete</i>	<i>Comments</i>
147	Phase 57 – Responses to Monitor Comments	Atkins' Validation Report for Phase 57 (ref. 5041216-REM-RPT-1407)	April 2015	Yes	Updated validation report received in October 2015

2. 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 57. This section of the report is structured as follows:

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

2.1 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.

2.1.1 Desk Study

From the information presented in Atkins' validation report 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 57. The following is of note:

Phase 57 is located on the western edge of the former refinery and was previously occupied by railway infrastructure, referred to as the railhead, and a barrelling plant. Reference should be made to the historical maps presented in **Appendix F**. Phase 57 is characterised by a sloping topography from east to west.

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

With regards hydrology, groundwater within Phase 57 is generally situated within the underlying drift deposits 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'. The direction of groundwater flow is thought to be towards the west in line with the topography. The closest surface water features to Phase 57 are the tip lagoons which lie approximately 130m to the west of Phase 57. Crymlyn Bog is located approximately 70m west of Phase 57.

2.1.2 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. These investigations included 62 exploratory holes within Phase 57.

Based on the findings of the site investigations, URS designated a number of 'Special Process Areas' which represented areas of potentially increased contamination associated with historical activities or processes. Five Special Process Areas were designated within Phase 57.

Between May 2014 and April 2015 Atkins undertook a site investigation which included the excavation of a further 302 machine excavated trial pits within Phase 57. Details of these site investigations are presented in Atkins' validation report.

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.

Land contamination is reported to have been evident within the soils based on visual and olfactory observations and elevated aesthetic criteria scores. Atkins reports that the maximum visual/olfactory observation, as defined in **Table 3** of this report, was a visual class of 5, however soils are reported to have generally been scored from 0 to 3.

Laboratory analysis of soil samples also indicated an RBSL/RTC exceedance for xylene. The implications of this exceedance are discussed further in Section 2.4 of this report. Atkins reports that visible asbestos containing material (ACM) was not recorded during the ground investigation.

Atkins reports that historical groundwater data indicate the presence of hydrocarbon contamination, although in the absence of thresholds for groundwater within a public open space area, the result of historical laboratory analysis of groundwater samples was screened against the commercial groundwater RBSL and no exceedances were identified. Small volumes of free product were reported during monitoring of boreholes within Phase 57.

2.2 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 57 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 3** of this report.

2.3 Redevelopment Remediation Works

The redevelopment remediation works that have been completed for Phase 57 are described in Atkins' validation report and can be summarised as follows:

- Further investigation in 13 locations where potential contamination had been identified during the intrusive investigations, either based on elevated aesthetic criteria scores or RBSL/RTC exceedances;
- Removal of oil saturated soils where visual/olfactory score of Class 5 (overwhelming hydrocarbon odour) were identified; and
- Removal of pipework that had been identified in 17 locations.

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

It should be noted that the remediation works were focused on addressing areas of concern that had been identified in the site investigation, rather than a more general turnover of soils as has been seen on a number of previous Phases elsewhere on site. Whereas these previous Phases involved a wider stripping of soils, allowing a more comprehensive inspection of the soils and increased confidence over the presence of contamination, the trial pit based approach adopted on this Phase means there is an inherent risk that contamination may have been missed. Nevertheless, the ground investigation was undertaken in line with the residential testing frequencies specified in the Section 106 Agreement which are relatively conservative, which improves confidence and reduces the likelihood that contamination could have been missed.

2.4 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.

It should be noted that in the absence of a detailed layout for the proposed development and confirmed FFLs, Atkins has assumed that the existing ground levels, having completed the redevelopment remediation works discussed above, represents FFL minus 1m.

Given the topography of Phase 57 and the presence of vegetation across parts of the phase, the Monitor considers it unlikely that 1m of fill material would be placed across the entire phase. Despite this, the Monitor has, as advised by Atkins, assumed that the existing ground levels represent FFL minus 1m across the entire phase. A topographical record of the ground levels upon which this certificate is based are shown on drawing 5041216-ATK-DR-C-REM-2127 Rev P1 a copy of which is provided in **Appendix G**.

It should be noted that if there is a significant change in the development proposals or the FFLs then reconsideration of the information contained within this certificate may be necessary.

2.4.1 Soil Chemical Quality

The Section 106 Agreement requires that the relevant recreational RBSLs must be achieved to an appropriate depth which, with reference to **Table 1** in this report, are the recreational RBSLs for soils below 1m depth. Furthermore, as discussed in Section 1.2.2 of this report, the RTCs derived by Atkins also apply.

Atkins reports that during the site investigation soils were logged in accordance with the aesthetic criteria listed in **Table 3** of this report. Atkins reports that there were localised areas of elevated visual/olfactory scores associated with residual petroleum hydrocarbons, especially in the south of Phase 57. Atkins also reports evidence of free phase hydrocarbons but states that the downstream impacts are considered to be managed by the RAP features which comprise product interception trenches along the western margins.

Atkins also reports that further consideration was given to a xylene exceedance which had been reported during the intrusive investigations. However, this exceedance was recorded at 4m below ground level and is reported to have been surrounded laterally and vertically by acceptable soils. Therefore Atkins considers this to be a localised hotspot with no plausible pathway to receptors in a public open space setting.

With regards asbestos, Atkins reports that a total of 281 soil samples received a routine screening for asbestos. Suspected asbestos was identified in 108 samples. Subsequent quantified assessment indicated the highest concentration to be 0.608% which is above the RBSL for shallow recreational soils of 0.02% as stated in **Table 1** of this report. However, given that the ground profile upon which this certificate is based represents FFL minus 1m, and there is no RBSL in relation to asbestos for deep soils within a public open space, no

further action was taken. This will need further consideration if the development proposals or FFLs are amended.

In summary, the Monitor is satisfied that the soils within Phase 57 appear to meet the necessary chemical requirements in accordance with the requirements of the Section 106 Agreement.

2.4.2 Validation Testing

The Section 106 Agreement does not specify a validation testing frequency for public open spaces, but instead requires that an appropriate scheme of validation testing must be undertaken. It is therefore necessary for the Monitor to determine whether or not the testing that has been carried out comprises an 'appropriate scheme of validation testing'.

As discussed in Section 2.1.2 of this report, Atkins' validation report states that the recent site investigation undertaken by Atkins comprised 302 machine excavated trial pits across Phase 57, the area of which is approximately 73,400m². This equates to a testing frequency of 1 per 243m².

Given that the testing frequency that has been achieved is broadly in line with the testing frequencies specified for deep residential soils of 1 per 100m² and deep commercial soils of 1 per 400m², the requirements for which are more conservative than those for a public open space, the Monitor is satisfied that an appropriate scheme of validation testing has been undertaken in accordance with the requirements of the Section 106 Agreement.

2.4.3 Detailed Designs to Discourage Access

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

With reference to the remediation requirements specified in the Section 106 Agreement, as listed in Section 2.2 above, it is considered that Phase 57 represents an area to which access will be discouraged but occasional access and/or trespassing is possible.

Atkins has proposed a number of measures to prevent or discourage access into the areas of concern across the site, including security 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.

Whilst detailed designs have not yet been prepared for Phase 57, the Monitor is satisfied that these measures are likely to offer adequate protection into areas of concern.

Nevertheless it is noted in Atkins' validation report 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 in the short to medium term, however once the development reaches the edges of Phase 57, then it may become necessary to implement further works to ensure adequate protection is provided. 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.

2.4.4 Protection of Human Health

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

Given that Atkins states that the ground levels upon which this certificate is based represents FFL minus 1m, the Monitor is satisfied that despite the presence of contaminated soils within Phase 57, as discussed in Section 2.4.1 above, the fact that Atkins reports that the highest levels of impact were reported at depth, the placement of 1m of fill material is likely to sufficiently protect human health in a public open space setting.

Furthermore, access is likely to be restricted as discussed in Section 2.4.3 above which should further protect human health by limiting exposure.

The Monitor is therefore satisfied that appropriate measures are in hand to ensure the protection of human health.

2.4.5 Removal of Buried Services

The Section 106 Agreement states that irrespective of the intended use, 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. 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.

Atkins reports that pipework was encountered in 17 locations during the site investigation, comprising 10 lengths of metal pipes; two lengths of clay pipe; two lengths of unknown pipe; and one length of ceramic pipe, with three further lengths of unknown pipes and cables. Atkins reports that all of these were removed during the works.

The Monitor is satisfied that the buried services that were encountered during the site investigation appear to have been removed from Phase 57. However, given the nature of the site investigation, which comprised a series of trial pits, it is considered possible that other buried services could have been missed and may still be present within Phase 57.

2.4.6 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 2.4.1 of this report, Atkins reports that localised areas of elevated visual/olfactory scores associated with residual petroleum hydrocarbons were identified during the site investigation, especially in the south of Phase 57. Atkins also reports evidence of free phase hydrocarbons which do not appear to have been removed.

As noted in Section 2.1.1 of this report, groundwater flow within Phase 57 is considered to be towards the west, with groundwater generally situated within the underlying bedrock. Atkins reports that down-gradient impacts are considered to be protected by the RAP features which comprise a series of product interception trenches.

Atkins considers this to be acceptable given that no development is proposed within the down-gradient areas which will remain as public open spaces with restricted access.

As above, should the development proposals change then further consideration will need to be given to this matter.

2.4.7 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.

As noted in Section 2.4 of this report, this certificate assumes that the existing ground levels, having completed the redevelopment remediation works discussed above, represents FFL minus 1m. Accordingly the top 1m of soils, including the top 0.5m of quality controlled imported fill materials, are yet to be placed, so this requirement is yet to be met for this phase.

It should be noted that the import of material 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.

3. CERTIFICATION

3.1 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 7** 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 7 Certificate Summary

Requirement	Status	Comments
The relevant RBSLs (recreational RBSLs) must be achieved to an appropriate depth.	Complete	Refer to section 2.4.1
An appropriate scheme of validation testing is required.	Complete	Refer to section 2.4.2
Develop detailed designs to discourage access.	Complete	Refer to section 2.4.3
The detailed designs must be protective of human health considering the reasonably anticipatable use of the land.	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

Requirement	Status	Comments
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

3.2 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 57.

3.2.1 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 57 and therefore this requirement is not considered to be relevant to the Phase.

4. CONCLUSIONS

4.1 RRWCC

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.

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.

It should be noted that Phase 57 is hereby certified as a public open space, which differs from the residential end-use shown on the current masterplan. If Phase 57 is to be developed as a residential phase in the future then further redevelopment remediation works will be required.

The scope of such works will have 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.

4.2

PWCD

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.

APPENDIX A DECLARATION OF PHASE BOUNDARY, INTENDED USE AND PROPOSED DEVELOPMENT LAYOUT



ST. MODWEN DEVELOPMENTS LIMITED - a ST. MODWEN company

Registration England 892832

Park Point, 17 High Street, Longbridge, Birmingham, B31 2UQ

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

21st May 2015

Our ref:

Coed Darcy Limited
Dumfries House
Dumfries Place
Cardiff
CF10 3ZF

Dear Sirs

Coed Darcy
Monitor Phase 57
Request for Phase Works Completion Date

We hereby give our written request seeking the declaration of the Phase Works Completion Date for Monitor Phase 57 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 57 boundary is shown on the attached Drawing No. 5041216-REM-DWG-1963.

The "Intended Use" for Phase 57 is assumed to be that of public open space end use.

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

Yours faithfully

Neil Williams

For and on behalf of St. Modwen Developments Limited

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

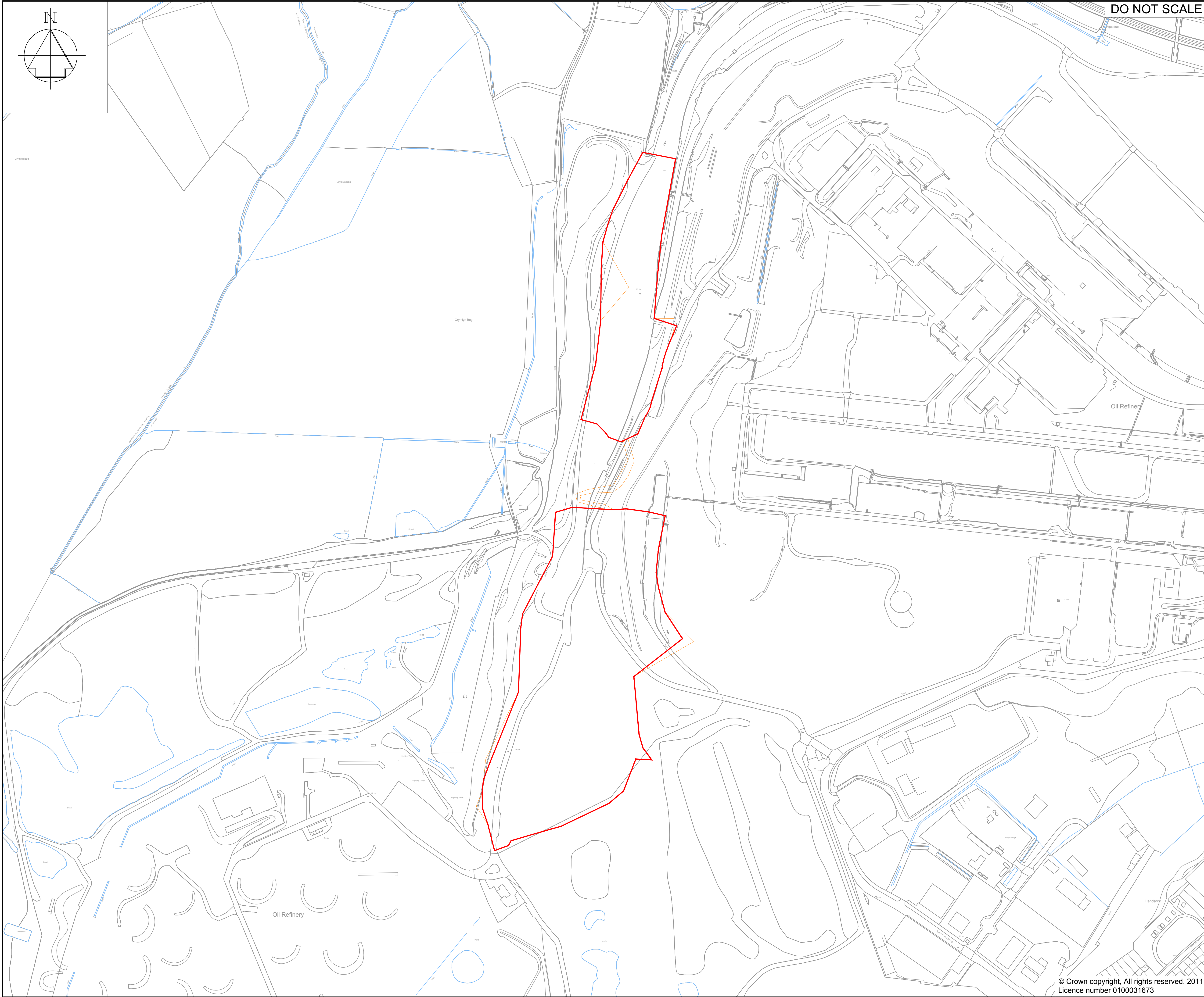
St. Modwen Properties PLC

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

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

Registration: England 349201

Drawing file: \\saskins.com\project\GBBMA-DE2\DWG\504-504-1216-Coed Darcy-DWG-WOR\WOR-1000-1999-1963-Phase 57 Boundary Plan.dwg



DO NOT SCALE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

MAINTENANCE/CLEANING

DECOMMISSIONING/DEMOLITION

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

KEY:

PHASE BOUNDARY

P 1	22/05/15	FIRST ISSUE	CK	CS
Rev.	Date	Description	By	Chk'd App'd

Drawing Status	FOR INFORMATION	Suitability
		S2

The Axis,
10 Holliday Street,
Birmingham,
B1 1TF

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Client

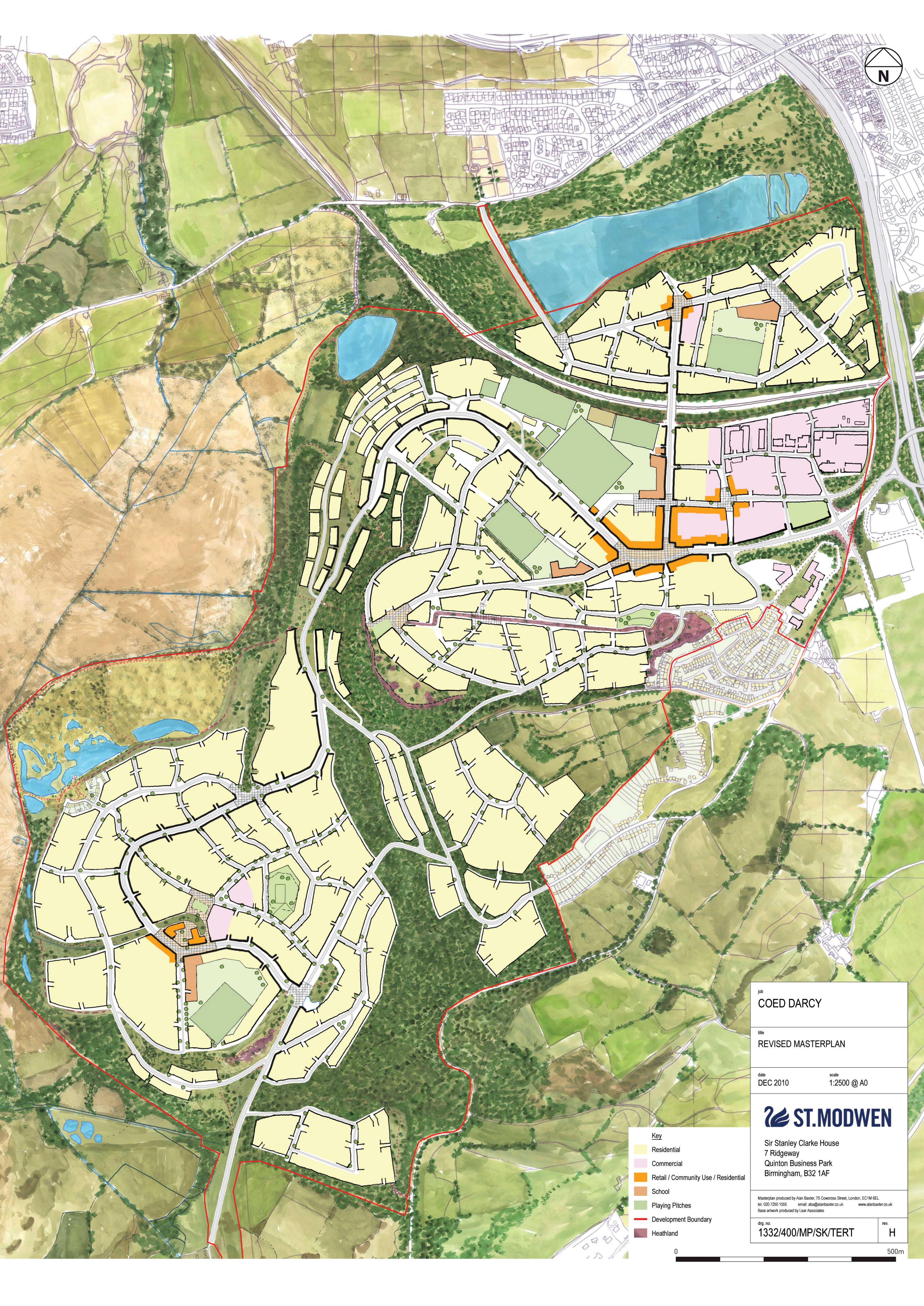
Project Title

COED DARCY

Drawing Title

PHASE 57 BOUNDARY PLAN

Scale	Designed	Drawn	Checked	Authorised
1:2000	CS	CK	CS	--
Original Size	Date	Date	Date	Date
A1	22/05/15	22/05/15	22/05/15	--/--/--
Drawing Number	Revision			
5041216-REM-DWG-0001963	P 1			



- 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

0 500m

APPENDIX B SCHEDULE 8 OF THE SECTION 106 AGREEMENT

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).

APPENDIX C COMPARISON OF RBSL AND RTC THRESHOLDS

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				

APPENDIX D INFORMATION SOURCES

APPENDIX E REQUESTS FOR INFORMATION (RFI)

Contract Name:	Coed Darcy Monitor	RFI No:
Contract Number:	GNP/NJR/13773-2	Date Raised: 25 June 2015
Subject:	Review of Atkins' Validation Report for Monitor Phase 57	
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 Monitor Phase 57 (report ref. 5041216-OSW-RPT-0001407):

- With reference to the phase boundary drawing it is noted that the proposed phase boundary overlaps with the boundaries for phases 14 and 39. In the case of Phase 14, the RAP certificate has already been issued and hence it is suggested that the phase boundary for Phase 57 should be amended accordingly.
- Section 1.1 - The report states that the intended use is public open space whereas the masterplan indicates that the phase shall comprise residential plots. Should the intended use change after the Monitor's RRWCC has been issued, then it should be noted that further validation and possibly further remediation works is likely to be required.
- Section 4.1 - This section states that 303 machine excavated trial pits were undertaken across Phase 57 however only 293 are marked on drawing 5041216-REM-DWG-0001964. Only 35 trial pits are marked on the drawing in the northern section of the Phase, not the 45 stated in the report.
- Section 4.2 - The two separate areas are not discussed in different sections, do the descriptions therefore apply as a general overview of the whole phase?
- Section 4.3 - This section states that 163 samples were analysed from the northern section. The results presented came from 47 different trial pits - the report states that 45 trial pits were excavated in this area while drawing 5041216-REM-DWG-0001964 only shows 35 trial pits.
- Section 4.3 - Some organic species with RBSL within the section 106 have not been analysed for. For example Dichloromethane and Vinyl Chloride among others.
- Section 4.3.1 - This section states that VO scores of 5 were identified in 46 locations but this does not correlate with results on the trial pit logs. Please review the logs and check the results.
- No groundwater sampling information is presented, historical or recent.
- The presence of asbestos is not discussed.
- No MCERTs are presented within this report.
- With reference to the exploratory hole location plan it is noted that there are a number of areas within the phase that have not been fully investigated. Depending on the proposed end-use it may be necessary to complete these investigations and achieve full coverage of the phase before the RRWCC can be issued.
- It is noted that further remediation works are required in order to satisfy the requirements of the Section 106 Agreement. It should be noted that the RRWCC will only be issued once these works have been completed and appropriately validated.
- The finalised validation report will need to include a topographical record of the ground profile pre-investigation, at the base of the remediation excavation and the finished ground profile.

Date: 25 June 2015

APPENDIX F HISTORICAL MAPS



ISSUE 1
~~SELECTED~~ - MEROX UNIT; POWER STN. N° 2; SUMP SEPARATORS A & B
 COOLING TOWERS A, B & C; 110.0 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, 103, 109, 210, 210.
~~ADDEND -~~ WRES GAS STATION; VDU PREHEAT & COOLING TOWER;
 110.0 OIL BLENDING ROAD LOADING GRANTY; WHITE OIL & LPG
 ROAD LOADING PARKING; TANK D.M. 1. TANKS B3,D4,D6,D7,D10,
 E9,B10; LORRY PARK.

ADDED - WARE GAS STATION; VDU PREHEAT & COOLING TOWER;
WHITE OIL SLACK WAX ROAD LOADING GANTRY; WHITE OIL & LRG.
RAIL LOADING GANTRIES; TANK D.M.1, TANKS D3,D4,D6,D7,D10,
E9,E10; CORRI PARK.

[illegible]

APPENDIX G TOPOGRAPHICAL RECORD OF GROUND LEVELS