

(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 Summary of Soil RBSLs

<i>Contaminant</i>	<i>Land-Use Specific Soil RBSL Surface to 1m below FFL (mg/kg)¹</i>			<i>Land-Use Specific RBSL Soil below 1m depth (mg/kg)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
<u>METALS & METALLOIDS</u>						
Arsenic	64	500	64	-	-	-
Cadmium	2.6	1400	2.6	-	-	-
Chromium	130	5000	200	-	-	-
Mercury	1	480	1	-	-	-
Nickel	50	5000	75	-	-	-
Selenium	3	8000	3	-	-	-
Lead	337	750	337	-	-	-
Vanadium	416	16000	640	-	-	-
Copper	200	-	200	-	-	-
Zinc	478	-	478	-	-	-
<u>ORGANIC SPECIES</u>						
Benzene	0.12	5	13	0.4	5	48
Benzo(a)pyrene ²	0.9	29	0.9	none	none	none
Toluene	36	1160	8110	52	389	none
Ethylbenzene	41	122000	4740	140	none	none
Xylenes	32	121000	7940	58	none	none
1,2-Dichloroethane	0.04	2	4.5	0.1	0.65	6

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
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	-	-

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“-” value not applicable to scenario

- "none" RBSL value exceeds soil saturation limits and free phase assessment appropriate
- 1 Lower value of human health RBSL or Soil Code value if higher than background LCL value (applicable to metals & metalloids only)
 - 2 Benzo(a)pyrene RBSL to be compared against sum of 16 US EPA Priority List PAHs using Toxicity Equivalence approach
 - 3 'Total' TPH RBSL derived for an area of development, based on individual RBSLs provided and available mass fraction TPH data in soil at time of derivation, using the inverse weighted average approach
 - 4 Refer to Section 106 Agreement for specification of relevant depth ranges

Table Summary of RBSLs for groundwater

<i>Contaminant</i>	<i>Land-Use Specific RBSL (mg/l)</i>		
	<i>Residential</i>	<i>Commercial</i>	<i>Recreational</i>
TPH Aliphatic EC>C6-C8	none	none	none
TPH Aliphatic EC>C8-C10	none	none	none
TPH Aliphatic EC>C10-C12	none	none	none
TPH Aliphatic EC>C12-C16	none	none	none
TPH Aliphatic EC>C16-C21	none	none	none
TPH Aliphatic EC>C21-C35	none	none	none
TPH Aromatic EC>C7-C8	20	97	none
TPH Aromatic EC>C8-C10	22	none	none
TPH Aromatic EC>C10-C12	none	none	none
TPH Aromatic EC>C12-C16	none	none	none
TPH Aromatic EC>C16-C21	none	none	none
TPH Aromatic EC>C21-C35	none	none	none
Benzene	0.7	6	198
Benzo(a)pyrene	none	none	none
Toluene	47	229	none
Ethylbenzene	102	506	none
Xylenes	43	607	none
1,2-Dichloroethane	0.2	0.82	45
Dichloromethane	150	624	none
Tetrachloroethene	22	115	none

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

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“none” theoretical RBSL greater than solubility limit

Table Scale of Aesthetic Criteria

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

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

Table Minimum Validation Testing Frequencies

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

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

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

Remediation Action Plan (RAP) Works

In addition to 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/BRRP00098/Cert 54a.

Information Sources

A summary of the information sources that the Monitor has been provided with in relation to Phase 54 is provided below in **Table 1**. Unless otherwise stated, the Monitor has relied solely on these information sources as the basis for issuing this RRWCC. Upon a review of the information sources, in the Monitor's reasonable professional opinion, such information and the manner in which it was obtained appears sufficiently up to date, reliable and robust to justify such reliance. No verification of the data has been completed by the Monitor unless noted in the following sections.

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

Table 1 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-0001345	Report	Validation Report Monitor Phase 54 Revision 1	Atkins	October 2015
4	5041216-OSW-TN-0001473	Technical Note	Phase 54 Response to Monitor RFI 0129	Atkins	October 2015

Requests for Information RFIs Issued by the Monitor

The Monitor has raised one RFI in relation to Phase 54, as summarised in **Table 2** below. A copy of the RFI is provided in **Appendix D**. Copies of the responses received are included in the information sources provided in **Appendix C**.

Table 2 RFIs

<i>RFI Ref.</i>	<i>Title</i>	<i>Associated Atkins Document</i>	<i>Date Raised</i>	<i>Complete</i>	<i>Comments</i>
129	Review of Atkins' Validation Report for Monitor Phase 54	Atkins Validation Report for Monitor Phase 54 ref. 5041216-OSW-RPT-0001345	May 2015	Yes	Response to RFI and updated validation report received

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 54. This section of the report is structured as follows:

1. Site Assessment
2. Remediation Strategy

3. Redevelopment Remediation Works
4. Validation

Site Assessment

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

Desk Study

From the information presented in Atkins' validation report (Information Source 3) 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 54. The following is of note.

Phase 54 is located in the northern part of the former Llandarcy Oil Refinery, to the north of a railway cutting for the Swansea District Line of the Great Western Railway. With reference to historical maps presented in **Appendix E** it is noted that Phase 54 was previously occupied by 50 above ground storage tanks, API oil-water separators and two electrical substations.

With regards geology, Atkins reports that the British Geological Survey Sheet for Swansea (Sheet 247) Drift Edition indicates that this part of the refinery is underlain by Glacial Till (Diamicton) overlying Hughes Member Pennant Sandstone.

With regards hydrology, groundwater within Phase 54 is generally situated within the underlying bedrock and it is considered likely that groundwater flow is radial from the centre of Phase 54. The underlying sandstones are classified as a Secondary A Aquifer, which are 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 closest surface water body is the North Site Reservoir which lies immediately north of Phase 54.

Intrusive Investigations

URS carried out a number of historic site investigations on behalf of the operator of the former refinery, as reported in URS' site investigation report FR1287 (Information Source 1). These investigations included 65 exploratory holes within Phase 54.

Between October and November 2014 Atkins undertook a site investigation which included the excavation of a further 1079 trial pits within Phase 54. This site investigation was carried out after the removal of historic structures within this area. Details of these site investigations are presented in Atkins' validation report (Information Source 3).

Logs from the trial pits indicate ground conditions to be consistent with the reported geology discussed above. Generally the soils comprise made ground, underlain with glacial soils over sandstone bedrock. Bedrock was predominantly encountered as a weathered zone comprising tabular sandstone gravel, cobbles and occasional boulders. Where proven, the depth to bedrock varied from 0.6m below ground level (bgl) to 5.4m bgl, becoming shallower towards the north of the Phase.

Land contamination is reported to have been evident within soils in some trial pits in the form of staining and odours. Laboratory analysis identified exceedances of the RBSLs for deep

commercial soils for TPH Aromatic C8-C10 in 15 samples. Loose asbestos fibres or debris were also reported to have been encountered in 308 samples.

Remediation Strategy

Schedule 8 of the Section 106 Agreement sets out the minimum remedial action required depending on the intended use and the groundwater regime. The intended use for Phase 54 has been declared as commercial and groundwater is primarily in rock, i.e. groundwater is normally first encountered in bedrock. However, the remediation scenarios presented in the Section 106 Agreement do not include a scenario for a commercial end-use where groundwater is in rock, only a commercial end-use where groundwater is in soil.

Atkins therefore proposed that the scenario for a commercial end-use where groundwater is in soil should be amended such that the depth to which the soils must meet the necessary requirements is defined by the surface of the underlying bedrock, rather than being defined by the depth to seasonal groundwater (the Section 106 Agreement specifies a depth of 2m below FFL or 0.5m below the likely lowest seasonal groundwater elevation for a commercial end-use where groundwater is in soil). All other requirements would remain the same.

The Monitor is satisfied with this approach, in that it meets the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement.

Therefore, with reference to the requirements that are specified in Schedule 8 of the Section 106 Agreement, amended as detailed above, the minimum requirements are as follows:

- The RBSLs and the aesthetic criteria, remediation quality and scope (including the depth below FFL to which quality standards are achieved) shall be achieved for each part of the property at the minimum validation frequencies set out in Clause 8 of Part 3 of the Section 106 Agreement (as applicable depending upon whether such part of the property is intended for use as residential, commercial or recreational land) as a minimum base level standard.
- All oil saturated soils and soil containing free product other than minor sheens shall be removed from ground level down to the surface of the underlying bedrock.
- All soils must meet the RBSL for TPH to at least 1m below FFL.
- All soils must meet in bulk, considering both dispersed fibres and pieces of asbestos containing material (ACM), the RBSL for ACM to at least 1m below FFL and any visible ACM encountered during construction in the first 1m below FFL is to be removed.
- Where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring. Such measures could include the installation of interception trenches and management of discharge from those. The Developer shall monitor whatever measures are put in place after their installation to continue to demonstrate their effectiveness.
- Where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.

Furthermore, Schedule 10 of the Section 106 Agreement sets out additional generic remedial requirements, the following of which are relevant to Phase 54:

- Irrespective of the intended use of each phase or part thereof, all existing buried services at the property shall be removed and the routes of those services shall be backfilled with material no more permeable than the general material in the vicinity. Where backfill to new underground services may become a pathway for residential pre-transfer date

contamination, appropriate control measures such as land drainage or venting measures shall be installed so as to appropriately protect remediated and/or developed areas

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

Based on the above requirements and the data collected during their site investigations, Atkins proposed further investigation and/or remediation works in the following locations:

- Where oil saturated soils or free phase product had been observed;
- Where laboratory analysis of soils indicated the presence of RBSL exceedances;
- Where pipework had been identified (30 locations); and
- Areas that were inaccessible at the time of initial trial pits for example near to the existing API separators.

The Monitor considered the above approach to be acceptable in accordance with the requirements of the Section 106 Agreement.

Redevelopment Remediation or s

The redevelopment remediation works that have been completed for Phase 54 are described in Atkins' validation report (Information Source 3) and can be summarised as follows:

- Further investigation around trial pits where visual/olfactory scores of 5 were recorded and free product was observed;
- Further investigation within and adjacent to the footprints of the two former electricity substations;
- Hot spot excavations where RBSL exceedances for TPH Aromatic C8-C10 were recorded; and
- Removal of pipework that had been identified in 30 locations.

It should be noted that the remediation works that have been carried out 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 testing frequencies specified in the Section 106 Agreement are relatively conservative, and furthermore the ground investigation was undertaken in line with the residential testing frequencies, rather than the commercial frequencies, which improves confidence and reduces the likelihood that contamination could have been missed. Furthermore the Section 106 Agreement does not specify the exact manner in which the works should be undertaken, so the Developer has not contravened any of the requirements. The Monitor is therefore satisfied that the works have been undertaken in accordance with the requirements of the Section 106 Agreement.

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.

Validation

With reference to the remediation requirements discussed in Section 2.2 of this report, the following sections aim to demonstrate whether or not the requirements of the Section 106 Agreement have been achieved.

It should be noted that in the absence of a detailed layout for the proposed development and confirmed FFLs, it has been assumed that the ground levels following the completion of the redevelopment remediation works represents FFL minus 1m. A topographical record of the ground levels upon which this certificate is based are shown on drawing 5041216-ATK-DR-C-REM-2079 Rev P1 a copy of which is provided in **Appendix F**.

Aesthetic Criteria and the Removal of Oil Saturated Soils

The Section 106 Agreement, amended as described in Section 2.2 of this report, requires that for a commercial phase all oil saturated soils and soil containing free product other than minor sheens shall be removed from ground level down to the surface of the underlying bedrock.

During Atkins' site investigation, soils were logged in accordance with the aesthetic criteria listed in **Table** of this report. Soils achieving an aesthetic classification of 5 (visible hydrocarbon product and/or overwhelming odour) were deemed to comprise oil saturated soils and/or soil containing free product and were therefore unsuitable for retention. Soils achieving an aesthetic classification of 4 or less were considered suitable for retention.

In locations where Atkins' site investigation recorded visual/olfactory scores of 5 and the presence of free product, the soils in the vicinity of the original trial pits were re-excavated. If visual/olfactory scores of 5 were again encountered during this further investigation, then the soils were removed and the excavation extended to delineate the extent of the impacted soils. Atkins reports that following the completion of these works the highest visual/olfactory classification recorded was 4 and the soils were therefore considered suitable for retention.

It should be recognised that adherence with the aesthetic criteria is somewhat subjective and furthermore the nature of the re-investigation itself, whereby the soils from the original trial pits are re-worked, will have an effect on the visual and olfactory evidence. However additional evidence in terms of the lack of RBSL exceedances, as discussed in the following section, gives the Monitor some confidence that the soils are suitable for retention.

It is noted that no trial pit logs were provided by Atkins for the re-investigation works, however the summary provided in Atkins' validation report (Information Source 3) appears to confirm the absence of oil saturated soils and soil containing free product within Phase 54.

In summary, the Monitor is satisfied that oil saturated soils and soil containing free product appear to have been removed from Phase 54.

Soil Chemical Quality and Testing Frequencies

The Section 106 Agreement requires that all soils must meet the RBSLs at the specified depths and in particular the RBSL for TPH to at least 1m below FFL. It should be noted that in addition to the RBSLs 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 **Appendi** .

With regards to the requirement to achieve the RBSL for TPH to at least 1m below FFL, given that the ground profile upon which this certificate is based represents FFL minus 1m, this requirement is not considered to be relevant to this phase and therefore only the RBSL/RTCs for deep commercial soils have been considered.

The Section 106 Agreement also requires that the soils must be tested in accordance with the specified minimum validation testing frequencies set out in **Table** in this report. With reference to that table, the following testing frequencies are considered to be relevant to Phase 54:

- In situ soils are to be tested on a regular grid at a minimum frequency of 1 per 400m², irrespective of the depth below FFL; and
- The faces of remedial excavations are to be tested at a minimum frequency of 1 per 15m², with a minimum of 1 sample per face.

Atkins reports that soil samples were collected from a total of 1,079 trial pits that were excavated across Phase 54, the area of which is approximately 130,000m². This equates to a testing frequency of 1 per 120m² which is compliant with the minimum testing frequency specified in the Section 106 Agreement of 1 per 400m².

It should be noted that the testing frequency that has been achieved significantly exceeds the minimum testing frequency specified for a commercial phase. This is because the site investigations were carried out in general accordance with the residential testing frequencies in order to fully delineate the extent of contamination present.

Further excavations were undertaken in locations where the RBSL for TPH Aromatic C8 - C10 was exceeded. Atkins reports that these excavations were advanced beyond the depth of the recorded failures and extended laterally by 5m in all directions. Validation samples were taken from excavation faces (1 per 15m²) and bases (1 per 400m²) to meet the validation frequencies set out in the Section 106 Agreement.

Laboratory analysis of the validation samples as well as the soil samples collected from the original trial pits indicated that the soils achieved the necessary RBSL/RTCs for deep soils in a commercial phase and were therefore suitable for retention.

In summary, the Monitor is satisfied that the soils within Phase 54 meet the necessary chemical quality requirements at the specified testing frequencies as stated in the Section 106 Agreement. It should however be noted that if the development layout and proposed FFLs differ significantly from the assumed FFLs, or if the intended use should change, then further remediation works will be required.

Groundwater Quality

In addition to the RBSLs for soils, the Section 106 Agreement also specifies RBSLs for groundwater as detailed in **Table** in this report. However the Section 106 Agreement does not envisage the remediation of groundwater contamination within bedrock, so long as it is controlled, for example seeps, sheens and iron rich discharges from bedrock must be controlled such that there is no visible discharge at surface and little or no odour.

Historic investigations carried out by URS identified RBSL exceedances for benzene in groundwater samples collected from two boreholes within Phase 54. Atkins reports that the two boreholes in which benzene was historically recorded (NSMW026 and WSMW141) were located in the approximate centre of Phase 54 but are no longer present. However Atkins has collected groundwater samples from four serviceable boreholes elsewhere within Monitor Phase 54 and benzene was not recorded above the laboratory method detection limit in any of the four samples.

This gives some reassurance that there is not a significant source present, and furthermore given that groundwater is situated within the underlying bedrock no further action would be considered necessary as the Section 106 Agreement does not envisage the remediation of groundwater contamination within bedrock.

With regards seeps, sheens and iron rich staining, Atkins does not report any such matters that were considered sufficiently significant to require control to prevent discharge at ground surface. Furthermore, given the depth of groundwater in relation to the FFL, it is considered unlikely that any such seepages would discharge at surface.

However it should be noted that North Site Reservoir is likely to have a significant impact on the groundwater regime for Phase 54 given its proximity. If, as intended in the original masterplan, the reservoir were to be removed and the original valley landscape restored, then this could result in springs or issues materialising at ground surface within the former reservoir. Given the groundwater regime it is likely that these springs would be influenced by groundwater within Phase 54 and could potentially be ochreous, thus requiring management. It is understood that the intention is for the reservoir to remain in its current state, however this matter would need to be given further consideration if this were to change.

In summary, the Monitor is satisfied that groundwater quality is unlikely to have a detrimental impact on Phase 54 and no further control measures are considered necessary in relation to the management of seeps, sheens and iron rich discharges.

Measures to Prevent Contamination Migration

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

As discussed in Section 2.1.1 of this report, groundwater flow within Phase 54 is likely to be radial from the centre of the phase, following the general topography of the ground. Given the absence of free product and oil saturated soils within Phase 54, the recontamination of down gradient areas is considered unlikely. Therefore measures to prevent the migration of contamination are not considered necessary for Phase 54.

In summary the Monitor is satisfied that there is minimal risk of migration in ground of hazardous gas or contaminated liquid into or out of Phase 54 and therefore no measures are considered necessary to prevent the recontamination of soils.

Asbestos

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

Given that the ground profile upon which this certificate is based represents FFL minus 1m, it is not necessary for the soils to meet the specified requirements in relation to asbestos. Nevertheless, Atkins has assessed the soils and reports that all 1,093 soil samples that were collected during the site investigation received a routine asbestos screening. Atkins reports that asbestos was detected in 308 samples and these were scheduled for quantitative assessment. The results presented in Atkins' validation report indicate that Asbestos

concentrations were found to exceed the ACM RBSL/RTC for shallow commercial soils of 300mg/kg (0.03%) in 30 samples.

However, given that there are no asbestos thresholds for commercial soils greater than 1m below FFL the soils were considered suitable for retention. The Monitor considers this to be acceptable.

Atkins also reports that no visible evidence of ACM was identified within Phase 54 during the site investigation. This is not correct because the Monitor was taken to view an area where suspected visible ACM had been found, as shown in the photos presented in **Figure** below.



Figure Suspected AC observed within phase comprising suspected asbestos rope left and suspected fragments of asbestos right

It is understood that this area was hand-picked by a licenced contractor and the suspected asbestos was bagged up and removed.

In summary, whilst the soils within Phase 54 meet the necessary requirements for asbestos, given that all soils are greater than 1m below FFL, it should be noted that suspected visible ACM was present within Phase 54. Whilst this certificate considers the requirements of the Section 106 Agreement in terms of the human health risks once the site has been developed, it does not consider the potential health and safety risks during construction. These risks will need to be given full consideration by any Contractor undertaking works in this area.

Removal of Buried Services

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

Atkins reports that pipework was encountered in 30 locations during the site investigation. Each of these locations was subject to further investigation and where pipework was encountered it was either broken up in situ or removed and the pipe route chased out as necessary.

From the notes provided in the trial pit logs and also Atkins' comments in their validation report, the Monitor is satisfied that the buried services appear to have been removed from Phase 54. However, given the nature of the site investigation it is considered possible that other buried services could have been missed and may still be present within Phase 54.

Recontamination of Soils

The Section 106 Agreement states that wherever there is a risk that following construction of the Urban Village groundwater or organic phase liquid may contaminate soils within the top 1m below FFL such that any of the relevant RBSLs and/or aesthetic criteria may be exceeded,

then all necessary steps should be taken to mitigate these risks. This may involve the installation of land drains and/or the raising of the site ground levels.

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

Fill to Achieve FFL

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

Atkins' validation report (Information Source 3) states that the post-remediation ground levels upon which this certificate are based generally represent FFL minus 1m and therefore the top 1m of soils, including the top 0.5m of quality controlled imported fill materials, are yet to be placed. As such this requirement is yet to be met for this phase.

A topographical record of the ground levels upon which this certificate are based is shown on drawing 5041216-ATK-DR-C-REM-2079 Rev P1 a copy of which is provided in **Appendix F**.

It should 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 certificate may be necessary. Furthermore, any subsequent import of material and/or removal of material from the phase following certification will need to be controlled by the Local Planning Authority as the Monitor will have no formal on-going role to control subsequent works once this RRWCC has been issued.

CERTIFICATE

Redevelopment Remediation works

The following section aims to confirm whether or not in the Monitor's professional opinion the redevelopment remediation works have been satisfactorily completed in accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement, having regard to the intended use. **Table** provides a list of the minimum remedial action required for a commercial phase where groundwater is in rock, as described in Section 2.2 of this report, and summarises whether or not each requirement has been achieved.

Table Certificate Summary

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

<i>Requirement</i>	<i>Status</i>	<i>Comments</i>
All oil saturated soils and soil containing free product other than minor sheens shall be removed from ground level down to the surface of bedrock.	Complete	Refer to Section 2.4.1 of this report.
All soils must meet the RBSL for TPH to at least 1m below FFL.	Not applicable	The top 1m of soils is yet to be placed. Refer to Section 2.4.2 of this report.
Where there is a risk of the migration in ground of hazardous gas or contaminated liquid into remediated areas, the Developer shall take all appropriate measures to prevent this occurring. Such measures could include the installation of interception trenches and management of discharge from those. The Developer shall monitor whatever measures are put in place after their installation to continue to demonstrate their effectiveness.	Complete	Refer to Section 2.4.4 of this report.
All soils must meet in bulk, considering both dispersed fibres and pieces of ACM, the RBSL for ACM to at least 1m below FFL and any visible ACM encountered during construction in the first 1m below FFL is to be removed.	Not applicable	The top 1m of soils is yet to be placed. Refer to Section 2.4.5 of this report.
Where necessary, seeps, sheens and iron rich discharges from the bedrock must be controlled such that there is no visible discharge at surface and little or no odour. Acceptable methodologies for remediation may include, but are not limited to the use of land drainage via interceptors.	Complete	Refer to Section 2.4.3 of this report.
Irrespective of the intended use of each phase or part thereof, all existing buried services at the property shall be removed and the routes of those services shall be backfilled with material no more permeable than the general material in the vicinity. Where backfill to new underground services may become a pathway for residential pre-transfer date contamination, appropriate control measures such as land drainage or venting measures shall be installed so as to appropriately protect remediated and/or developed areas.	Complete	Refer to Section 2.4.6 of this report.

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

Preventative Measures

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

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

The Monitor has not received any such documentation or requests in relation to Phase 54.

Ground Gas

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

Atkins is yet to undertake a detailed ground gas assessment for Phase 54 but this will be necessary in order to specify appropriate gas and vapour protection measures. Such measures will need to be agreed with the relevant regulatory authorities prior to installation.

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RR CC

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 during the remediation works, the Monitor is satisfied that the redevelopment remediation works for Phase 54 appear to have been completed in general accordance with the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement, having regard to the specified intended uses, and that the purpose, objectives and requirements of Schedule 8 of the Section 106 Agreement are likely to continue to be met for the foreseeable future without the need for further remedial action in relation to or affecting the area within the phase boundary.

It should be noted that Phase 54 is hereby certified as a commercial phase, which differs from the residential end-use shown on the current masterplan. If Phase 54 is developed as a residential phase then further redevelopment remediation works will be required. The scope of such works will need to be agreed with the Local Authority as the Monitor will have no formal on-going role to control subsequent works once this RRWCC has been issued.

C

The PWCD will be declared 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.

A E I A ECLARATION OF ASE BO AR I TE E SEA RO OSE E ELO E TLA O T



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

7th April 2015

Our ref:

Coed Darcy Limited
Dumfries House
Dumfries Place
Cardiff
CF10 3ZF

Dear Sirs

Coed Darcy
Monitor Phase 54
Request for Phase Works Completion Date

We hereby give our written request seeking the declaration of the Phase Works Completion Date for Monitor Phase 54 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 54 boundary is shown on the attached Drawing No. 5041216-REM-DWG-1830.

The “Intended Use” for Phase 54 is assumed as that of proposed commercial 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

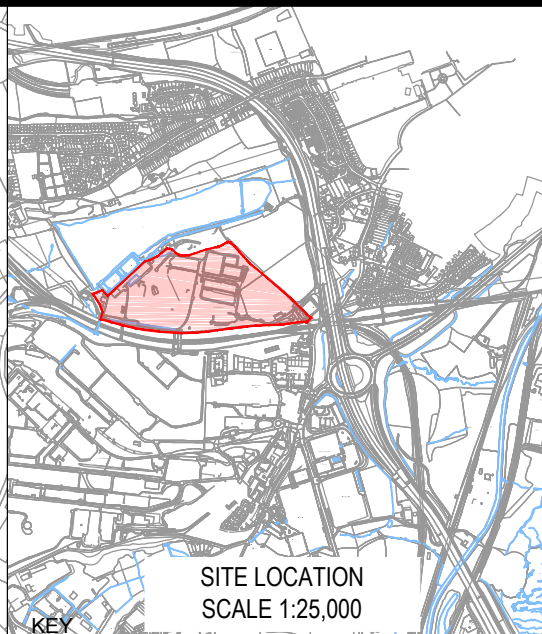
Cc Rhys Mander, Llancoed House, Coed Darcy, Neath, SA11 8AZ

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



SITE LOCATION
SCALE 1:25,000



MONITOR BOUNDARY PHASE 54

REVISIONS	Drawn By	Checked By	Date
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PURPOSE OF ISSUE	Rev.	Authorised for issue	Date
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Atkins Limited

Telford Office
Cornerstone House
Stafford Park 13
Telford TF3 3AZ

Tel 01952 201234
Fax 01952 200981

Birmingham Office
The Axis, 10 Holliday Street
Birmingham
West Midlands B1 1TF

Tel 0121 483 5000
Fax 0121 483 5252

THIS DRAWING IS NOT TO BE SCALED

CLIENT
ST.MODWEN

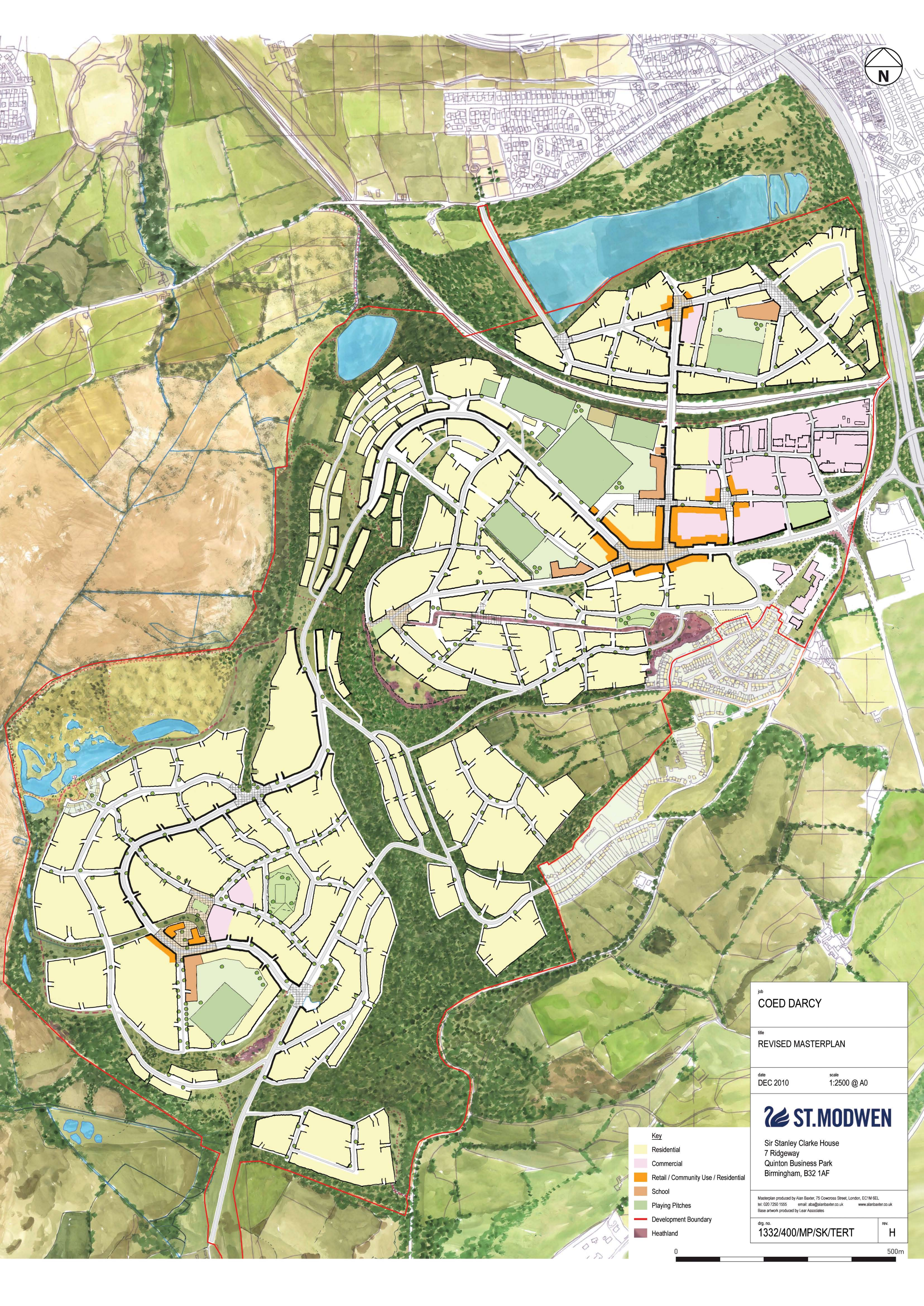
PROJECT
COED DARCY

DRAWING TITLE
MONITOR BOUNDARY PHASE 54

SCALES	DRAWN	CHECKED	CO-ORD CHECK
N.T.S.	MJ	CS	
	DATE	DATE	DATE
	26.03.15	26.03.15	

DRAWING NO	SHEET	PLOT DATE
5041216-REM-DWG-1 of 30	A3	13.04.15

REV
-



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

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

0 500m

A E I B SC E LE OF T E SECTION A REE E T

SCHEDULE 8

Redevelopment Remediation Works

Purpose, objectives and requirements of the Redevelopment Remediation Works

Part 1

1. Purpose and objectives of the Redevelopment Remediation Works

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

Part 2

2. Developer's obligations regarding Redevelopment Remediation Works

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

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

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

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

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

Part 3

Table 1 – Summary of Soil RBSLs

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

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

“-“ value not applicable to scenario

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

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

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

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

⁴ See text below for specification of relevant depth ranges

Table 2 – Summary of RBSLs for Groundwater

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

“none”= theoretical RBSL greater than solubility limit

3. Scale of aesthetic criteria

Table 3 – Scale of aesthetic criteria

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

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

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

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

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

4.2 All oil saturated soil should be removed.

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

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

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

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

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

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

5. Residential End-Use where Groundwater is in soil

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

6. Commercial End-Use where Groundwater is in soil

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

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

7. Public Open Space

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

8. Validation

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

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

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

Table 4 - Minimum Validation Testing Frequencies.

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

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

VO = visual / olfactory (ie aesthetic) observation

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

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

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

A E I C I FOR ATIO SO RCES

A E I RE ESTS FOR I FOR ATIO RFI

Contract Name:	Coed Darcy Monitor	RFI No:
Contract Number:	GNP/NJR/13773-2	Date Raised: 6 May 2015
Subject:	Review of Atkins' Validation Report for Monitor Phase 54	
To:	Michelle Lee	Atkins
Cc:	Mike Poland	Atkins
From:	Rhys Mander	AECOM

Comments

This RFI has been raised following a review of Atkins' report titled 'St. Modwen Developments (Monitor Phase 54) Validation Report' ref. 5041216-OSW-RPT-0001345 dated April 2015.

- It is noted that the intended use for Phase 54 has been declared as a commercial end use which is not in accordance with the current version of the masterplan. Whilst ultimately this should not in itself be reason for withholding a Redevelopment Remediation Works Completion Certificate (RRWCC), it is assumed that this matter has been brought to the attention of Coed Darcy Limited and St. Modwen Developments Limited.
- Glossary of Terms – The abbreviation for Risk Based Screening Level is listed as 'RSBL' rather than 'RBSL'.
- Section 5.3 – Soil samples have been tested for metals but given that these will be deep soils, there are no remedial targets. Was there a particular reason for including metals? Do the results raise any concerns?
- Section 5.3 – Soil samples have been tested for Phenanthrene, PAH and MTBE. Again, there are no remedial targets. Was there a particular reason for including this and do the results raise any concerns?
- Section 5.3.1 – The report states that 1071 trial pits have been excavated, however approximately 1220 can be counted on Drawing 5041216-REM-DWG-1833. It is also stated that visual/olfactory scores of 5 were recorded in 45 locations, relict pipework was encountered in 30 trial pits and that asbestos exceedences were identified at 31 locations. However, Drawing 5041216-REM-DWG-1841 indicates visual/olfactory exceedences in 22 locations, in-situ relict pipework recorded in 31 locations and asbestos exceedences are noted in 29 trial pits. Please clarify these discrepancies.
- It should be noted that Drawing 5041216-REM-DWG-1841 is numbered incorrectly in the top left corner.
- It is noted in Table 5.2 that several observations of the presence of hydrocarbon have been noted. With reference to the aesthetic criteria specified in the Section 106 Agreement, any observations of 'visible hydrocarbon' should be scored as 5. However, many of the visual scores listed in Table 5.2 are below 5 despite the comments suggesting the presence of hydrocarbon. Whilst it is noted that the intention is for these areas to be re-investigated and remediated, this raises concerns given the emphasis placed by the Section 106 Agreement on the visual/olfactory scorings.
- Appendix B – There are 1118 trial pit logs which does not match up to the 1071 trial pits stated in the report, or the 1220 that can be counted on Drawing 5041216-REM-DWG-1833. Please could the number of trial pits be confirmed?
- Drawing 5041216-REM-DWG-1833 appears to suggest a lack of trial pit locations along the eastern and western boundaries. Whilst, with reference to the historical maps, the lack of investigation on the eastern side could possibly be justified (albeit not in accordance with the requirements of the Section 106 Agreement) the lack of trial pits within the northwestern part of Phase 54 is more of a concern. It is noted in Section 6.1 that the area to the northeast of the API Separators is yet to be investigated. Will the other areas be fully investigated? If not then justification should be provided.
- It is noted that a treatment pad has been constructed on part of Phase 54. Confirmation is required that the area beneath has been remediated to satisfactorily meet the requirements of the Section 106 Agreement. It should also be noted that once a RRWCC has been issued, any subsequent redevelopment of Phase 54 may require further validation of the soils underlying the treatment pad once it has been removed.
- 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.

Date: 6 May 2015

A E I E HISTORICAL A S



ISSUE 1
~~DELETED~~ - MEROX UNIT; POWER STN. NO. 2; SWAP SEPARATORS A & C; COILING TOWERS A, B & C; LUB. OIL BLENDING DESPATCH PLANT; BOTTLED GAS DESPATCH PLANT;
 TANKS: 105, 106, 107, 110, 111, 113, 114, 115; 227 TO 233 INC.;
 301 TO 318 INC.; 400 TO 412 INC. 415 TO 430 INC. 433, 434, 437, 438, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.
 REDES. - WAREHOUSE STATION; VDU PNEUMATIC COOLING TOWER;
 WHITE OIL SLURRY MIX. ROAD. COOLING GRANTER; WHITE OIL & L.F.G.
 RIG COOLING GRANTER; TRUCK DRAI. TANKS D3, D4, D6, D7, D10, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D46, D47, D48, D49, D50, D51, D52, D53, D54, D55, D56, D57, D58, D59, D60, D61, D62, D63, D64, D65, D66, D67, D68, D69, D70, D71, D72, D73, D74, D75, D76, D77, D78, D79, D80, D81, D82, D83, D84, D85, D86, D87, D88, D89, D90, D91, D92, D93, D94, D95, D96, D97, D98, D99, D100.
 E10, E11, E12, E13, E14, E15, E16, E17, E18, E19, E20, E21, E22, E23, E24, E25, E26, E27, E28, E29, E30, E31, E32, E33, E34, E35, E36, E37, E38, E39, E40, E41, E42, E43, E44, E45, E46, E47, E48, E49, E50, E51, E52, E53, E54, E55, E56, E57, E58, E59, E60, E61, E62, E63, E64, E65, E66, E67, E68, E69, E70, E71, E72, E73, E74, E75, E76, E77, E78, E79, E80, E81, E82, E83, E84, E85, E86, E87, E88, E89, E90, E91, E92, E93, E94, E95, E96, E97, E98, E99, E100.
 F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36,

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

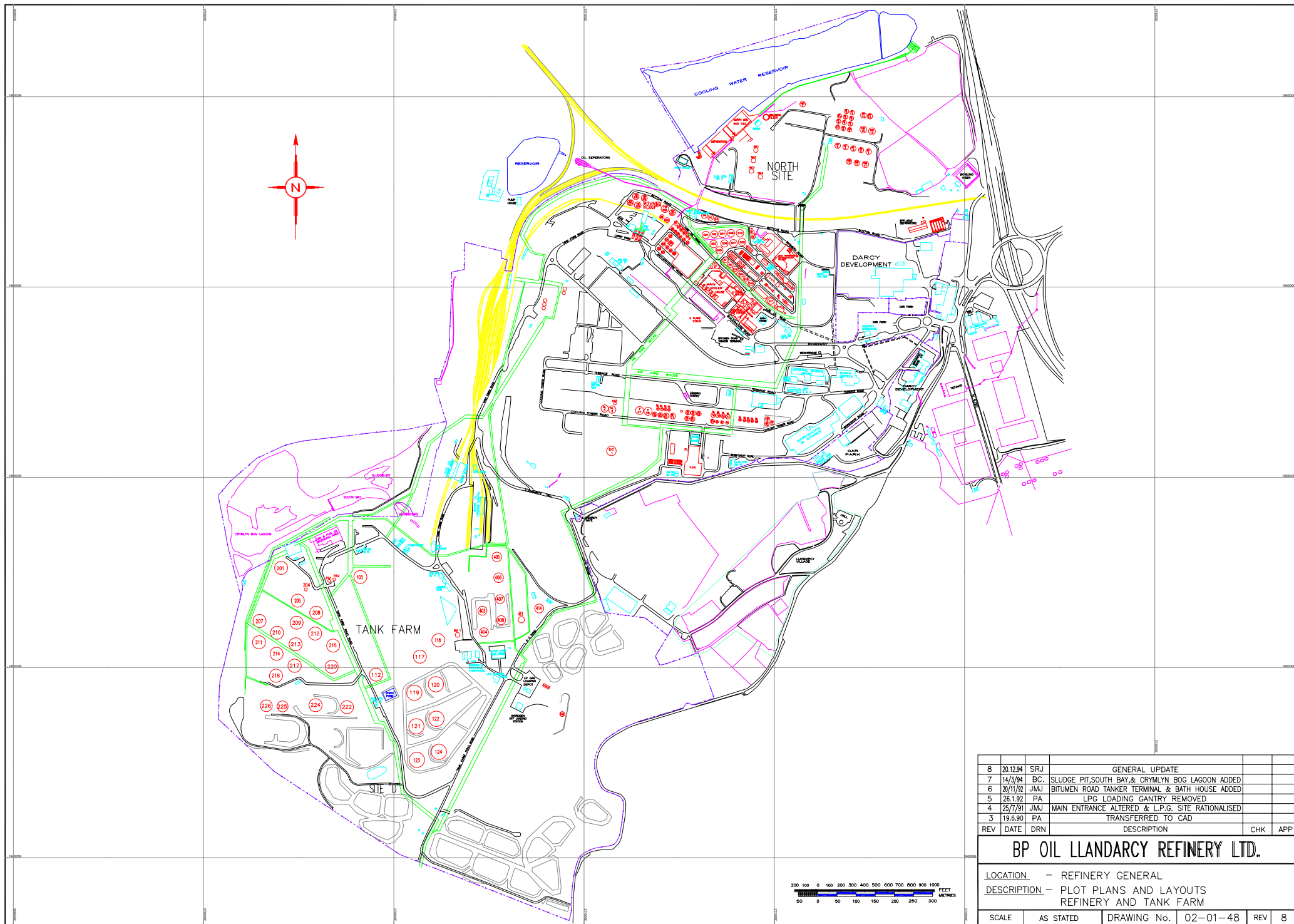
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GATE	KEY NO	RING NO	LOCATION	GATE	KEY NO	RING NO	LOCATION
1	194	1F	MAIN GATE	13	425	9F	OLD SUNBURY COMPOUND
2	208/588	2F	WEST GATE	14	335/638	10F	T.V.O. COMPOUND (B SITE GATE)
3	572	3F	EAST WALL GATE	15	1225/A122	11F	C. SITE GATE
4/5/6	A1660/529/503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

DRG. N° 34811.



GATE	KEY NO	RING NO	LOCATION	GATE	KEY NO	RING NO	LOCATION
25/26	A1821/596/421	17F	TANK FARM GATE, GATE OFF CRYMMLYN	38/39/40	112/A367/A2266	24F	TENNENT CANAL PUMPHOUSE
27-28-29-30-32	A2310/602/595 A2306/609/407	18F	NORTH SITE RESERVOIR GATES	41-48	168/531	25F	A.F.R.D.
33	A1470	19F	EMERGENCY GATE TO NORTH SITE (FROM FIELD)	49/50	599/604	26F	FREEMANS BUND
34	494	20F	NORTH SITE GATE NR BOWLING GREEN	52/53	A1428/A1458	28F	COURTYARD GATES, REAR MED CENTRE
35	603	21F	WICKET GATE TO RAIL EMBANKMENT				
36	246	22F	OLD PROTECT GATE (BADGERS)				
37	1093	23F	EMERGENCY GATES, MEDICAL CENTRE				

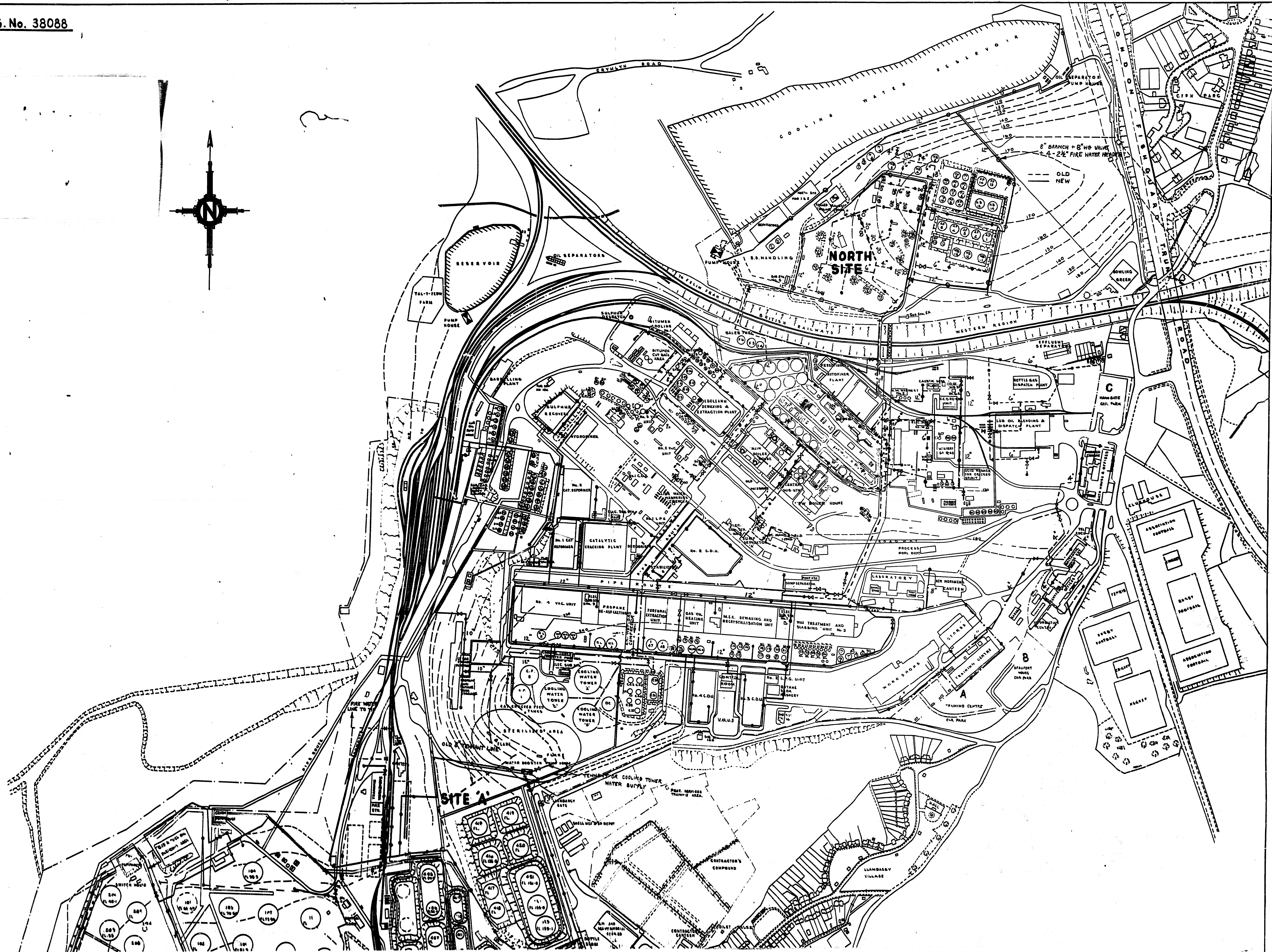
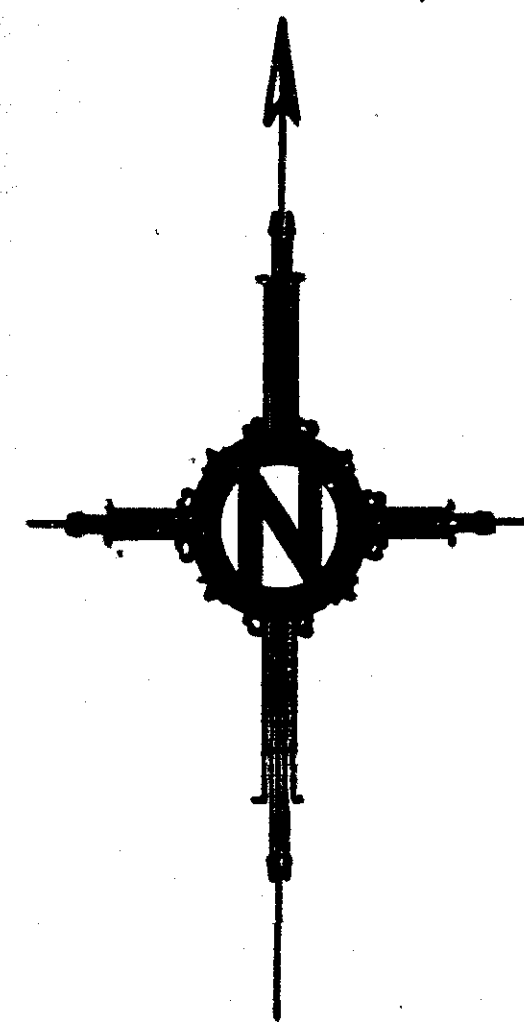


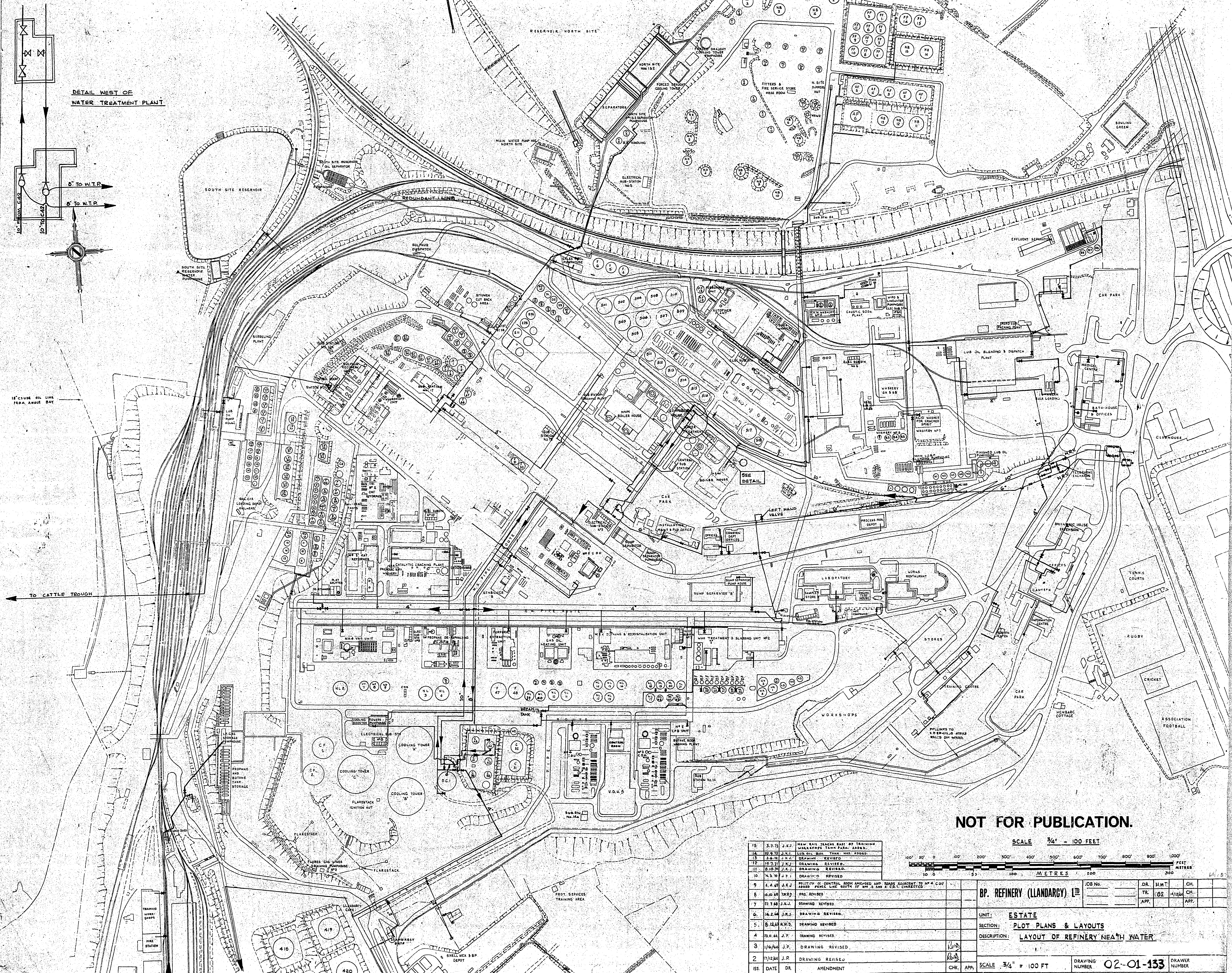
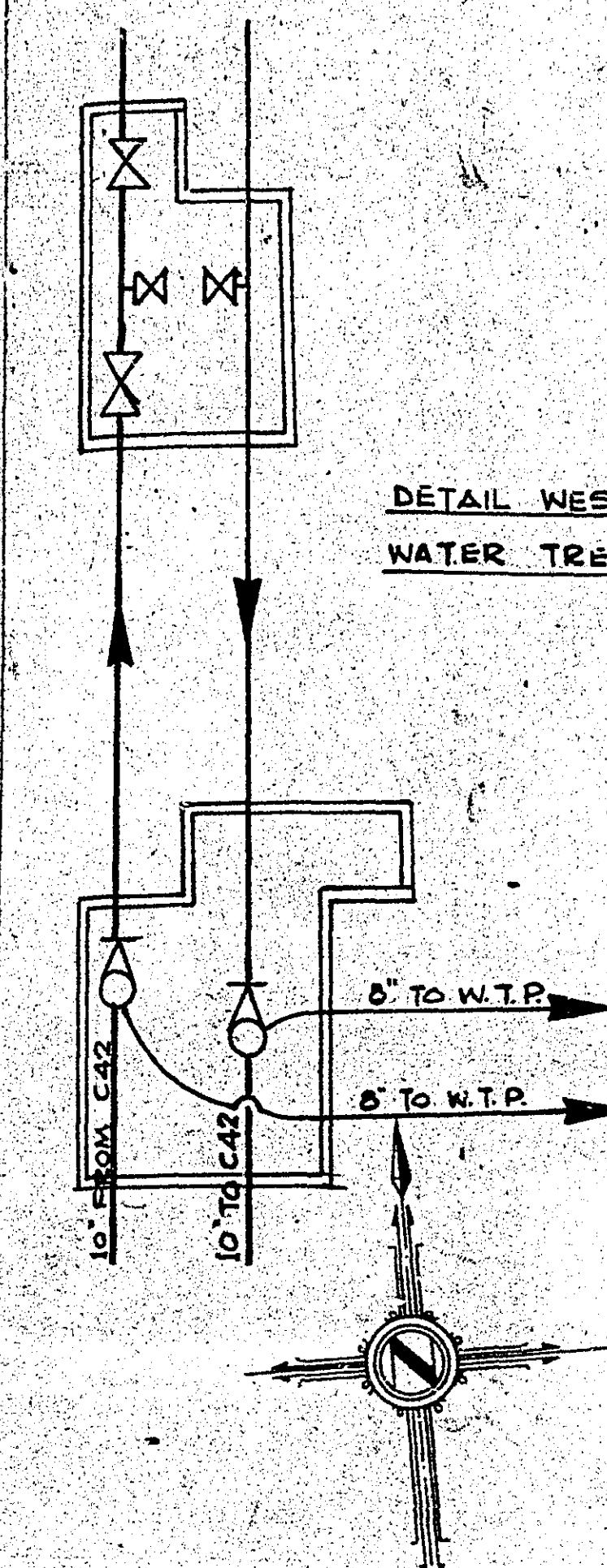
8	20.12.94	SRJ	GENERAL UPDATE		
7	14/3/94	BC	SLUDGE PIT, SOUTH BAY & CRYMLYN BOG LAGOON ADDED		
6	20/11/92	JMJ	BITUMEN ROAD TANKER TERMINAL & BATH HOUSE ADDED		
5	26.1.92	PA	LPG LOADING GANTRY REMOVED		
4	25/7/91	JMJ	MAIN ENTRANCE ALTERED & L.P.G. SITE RATIONALISED		
3	19.6.90	PA	TRANSFERRED TO CAD		
REV	DATE	DRN	DESCRIPTION	CHK	APP

BP OIL LLANDARCY REFINERY LTD.

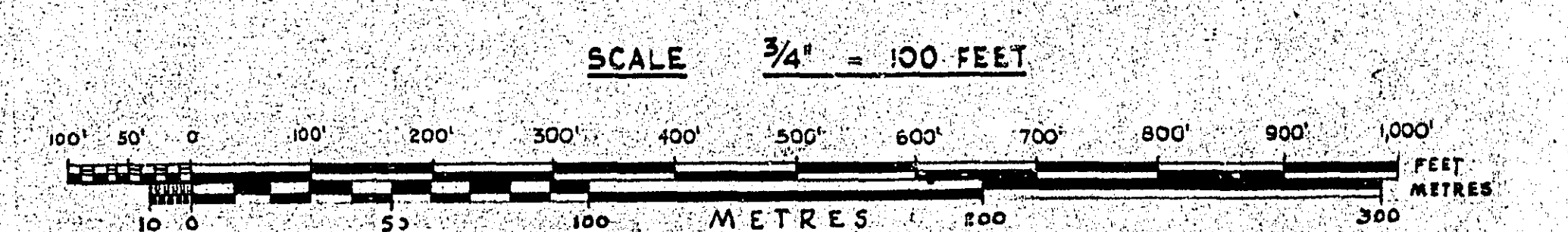
LOCATION - REFINERY GENERAL
DESCRIPTION - PLOT PLANS AND LAYOUTS
REFINERY AND TANK FARM

SCALE	AS STATED	DRAWING No.	02-01-48	REV	8
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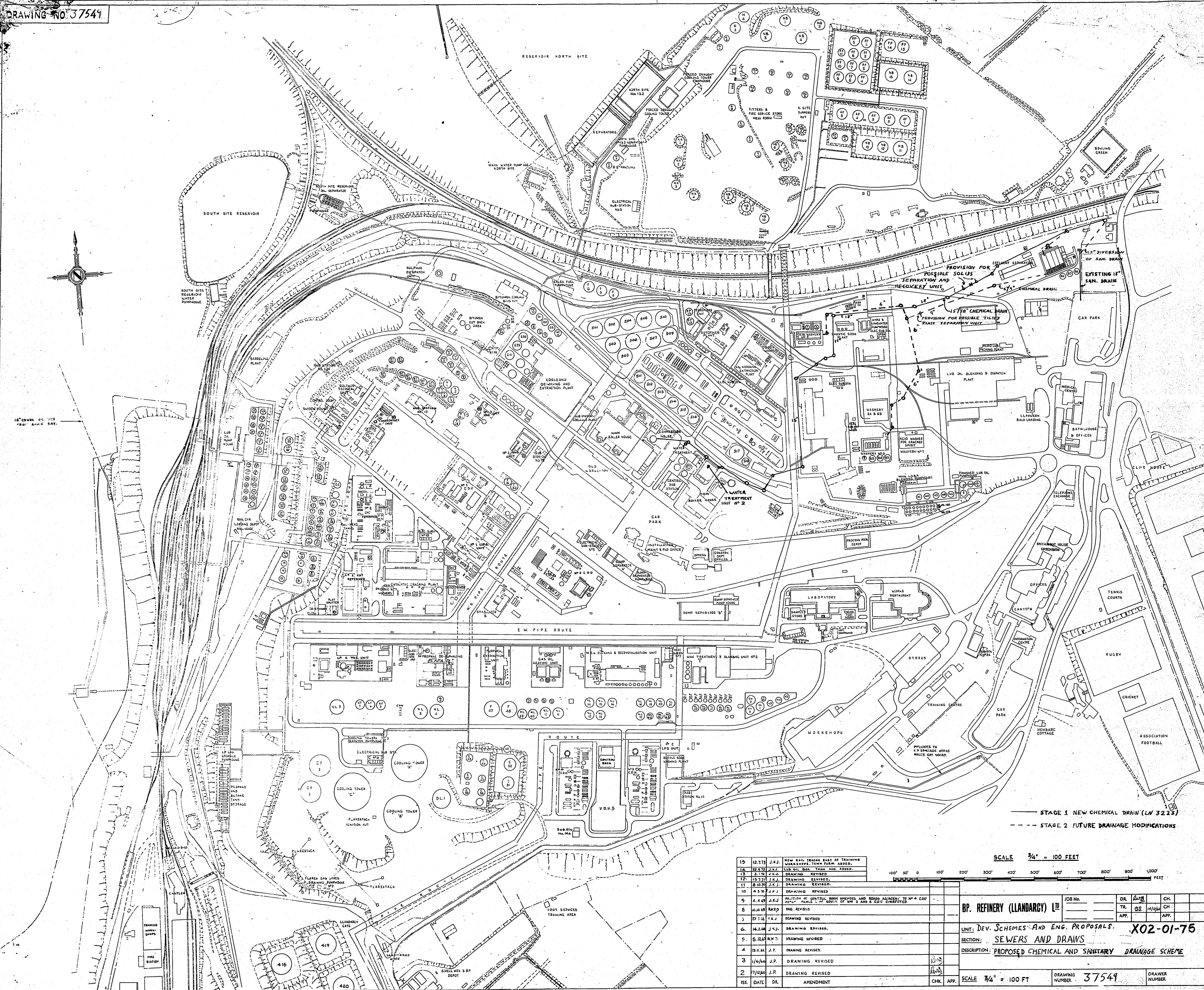


NOT FOR PUBLICATION.



15	3.7.71	J.K.J.	NEW RAIL TRACKS EAST OF TRAINING WORKSHOPS. TANK PARK ADDED.
14	22.9.70	J.K.J.	LUB OIL BLENDING TANKS. ADDED.
13	3.6.70	J.K.J.	DRAWING REVISED.
12	12.7.71	J.K.J.	DRAWING REVISED.
11	8.10.70	J.K.J.	DRAWING REVISED.
10	24.3.70	J.K.J.	DRAWING REVISED.
9	4.4.69	J.K.J.	REVISION OF CENTRAL ROAD ADJACENT TO NO. 4 C.D. CORRECTED.
8	10.10.68	J.K.J.	DRG. REVISED.
7	21.7.68	J.K.J.	DRAWING REVISED.
6	14.2.68	J.K.J.	DRAWING REVISED.
5	8.12.67	R.W.D.	DRAWING REVISED.
4	23.11.66	J.P.	DRAWING REVISED.
3	1/6/64	J.P.	DRAWING REVISED.
2	7/12/64	J.P.	DRAWING REVISED.
1	DATE	DR.	AMENDMENT

BP. REFINERY (LLANDARCY) LTD
UNIT: ESTATE
SECTION: PLOT PLANS & LAYOUTS
DESCRIPTION: LAYOUT OF REFINERY NEATH WATER



— STAGE 1 NEW CHEMICAL DRAIN (LN 3223)
 - - - STAGE 2 FUTURE DRAINAGE MODIFICATIONS

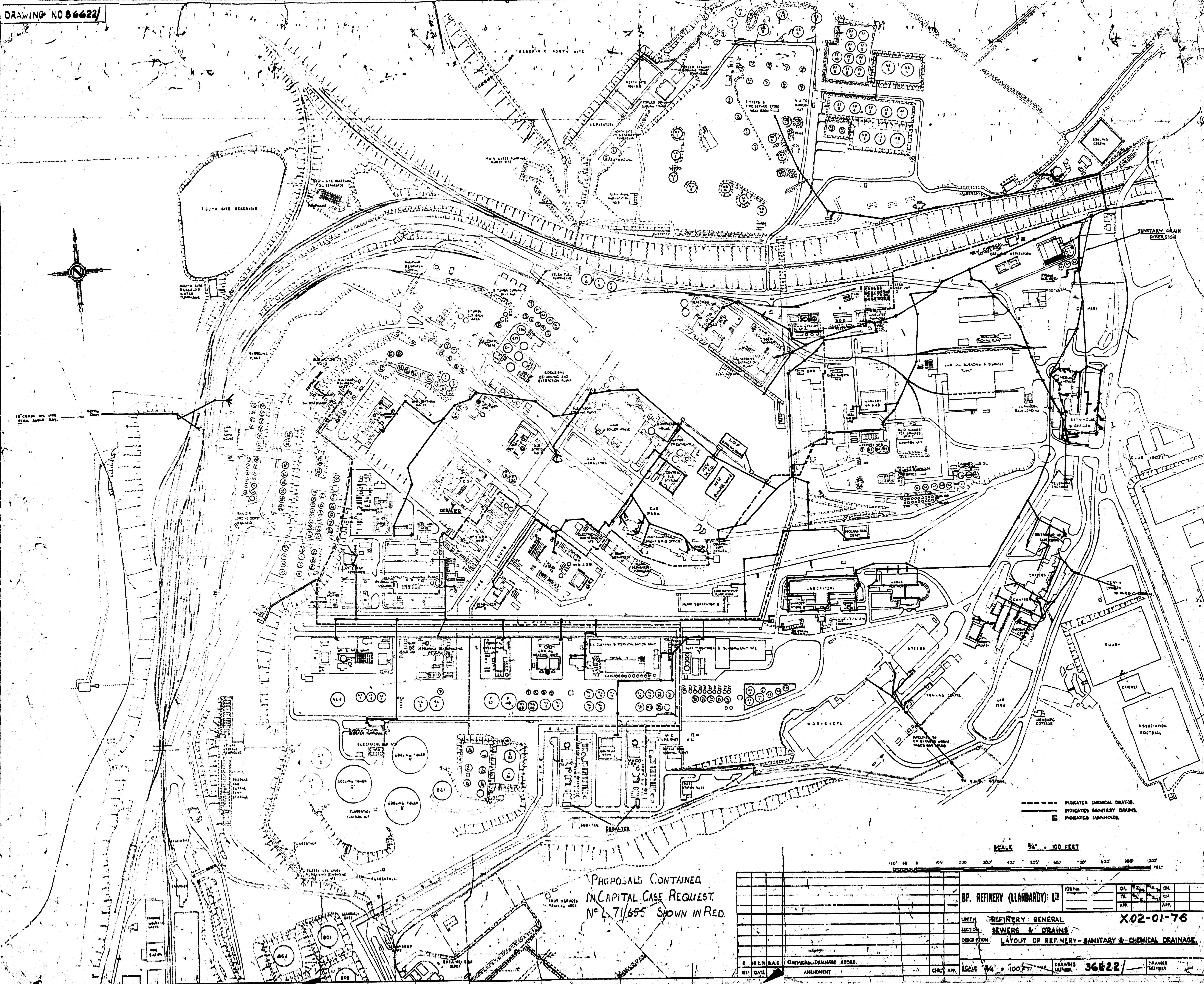
SCALE 3/4" = 100 FEET

100' 50' 0 100' 200' 300' 400' 500' 600' 700' 800' 900' 1000'
 FEET

15	12.7.73	J.K.J.	NEW RAIL TRACKS EAST OF TRAINING WORKSHOPS, TANK FARM, ADDED.
14	22.9.72	J.K.J.	LUB OIL BKG. TANK HAS ADDED.
13	3.1.72	J.K.J.	DRAWING REVISED.
12	10.3.71	J.K.J.	DRAWING REVISED.
11	8.10.70	J.K.J.	DRAWING REVISED.
10	4.3.70	J.K.J.	DRAWING REVISED.
9	4.4.69	J.K.J.	POSITION OF CONTROL ROOM AMPLIFIED AND ROADS ADJACENT TO NO. 4 CDU ADDED. FENCE L. OF ROAD OF NO. 3 AND 4 CDUs CHANGED.
8	6.10.68	R.M.D.	DWG. REVISED.
7	27.1.68	J.K.J.	DRAWING REVISED.
6	16.2.66	J.K.J.	DRAWING REVISED.
5	5.12.65	R.M.D.	DRAWING REVISED.
4	23.8.64	J.P.	DRAWING REVISED.
3	1/6/64	J.P.	DRAWING REVISED.
2	7/12/64	J.P.	DRAWING REVISED.
155	DATE	DR.	AMENDMENT

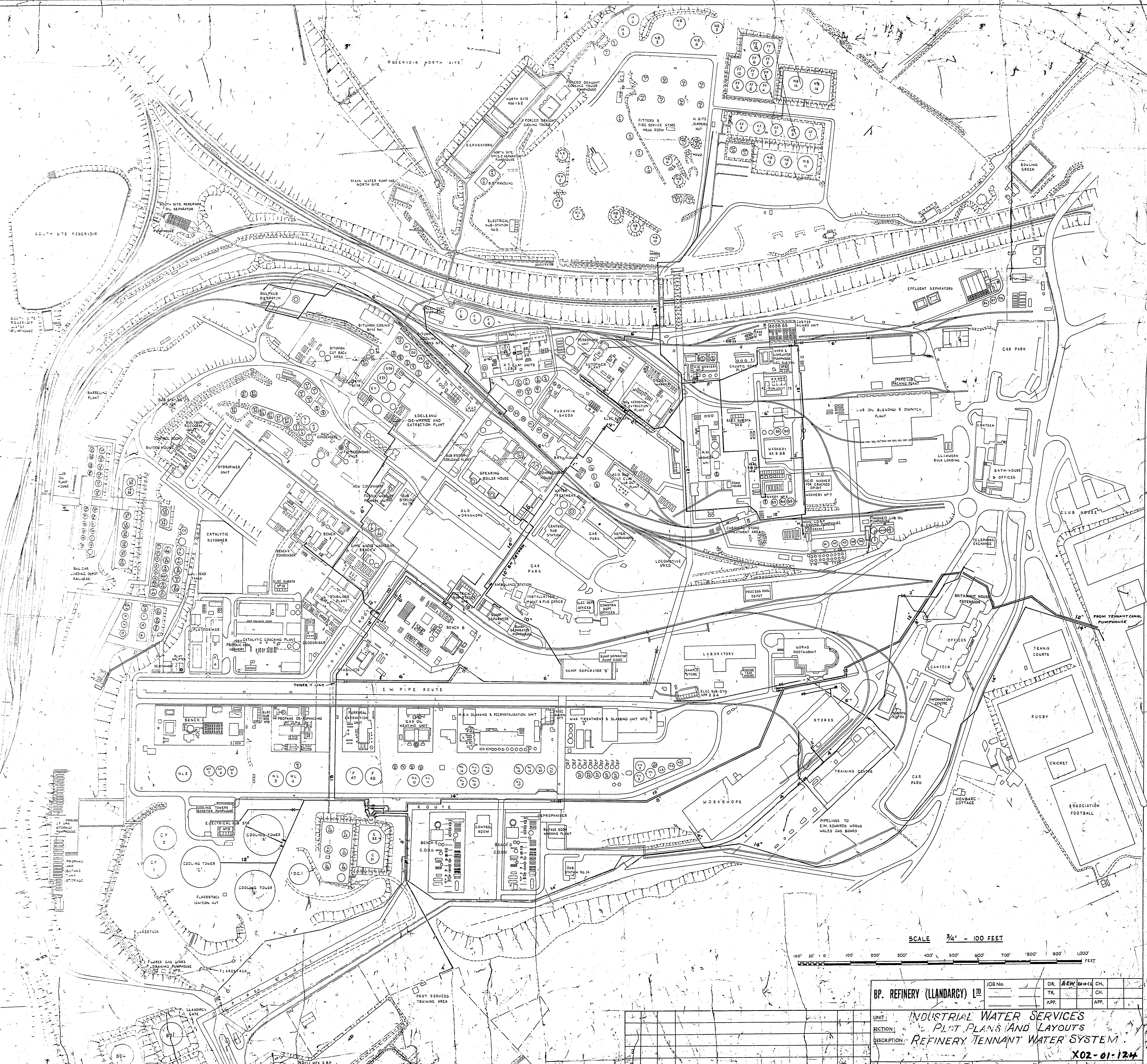
BP. REFINERY (LLANDARCY) LTD. JOB No. DR. *Law* CH. TR. OS. *H/19/64* CH. APP. APP.
 UNIT: DEV. SCHEMES AND ENG. PROPOSALS. X02-01-75
 SECTION: SEWERS AND DRAINS
 DESCRIPTION: PROPOSED CHEMICAL AND SANITARY DRAINAGE SCHEME

SCALE 3/4" = 100 FT. DRAWING NUMBER 37549 DRAWER NUMBER



PROPOSALS CONTAINED
IN CAPITAL CASE REQUEST
Nº L 71/655 SHOWN IN RED.

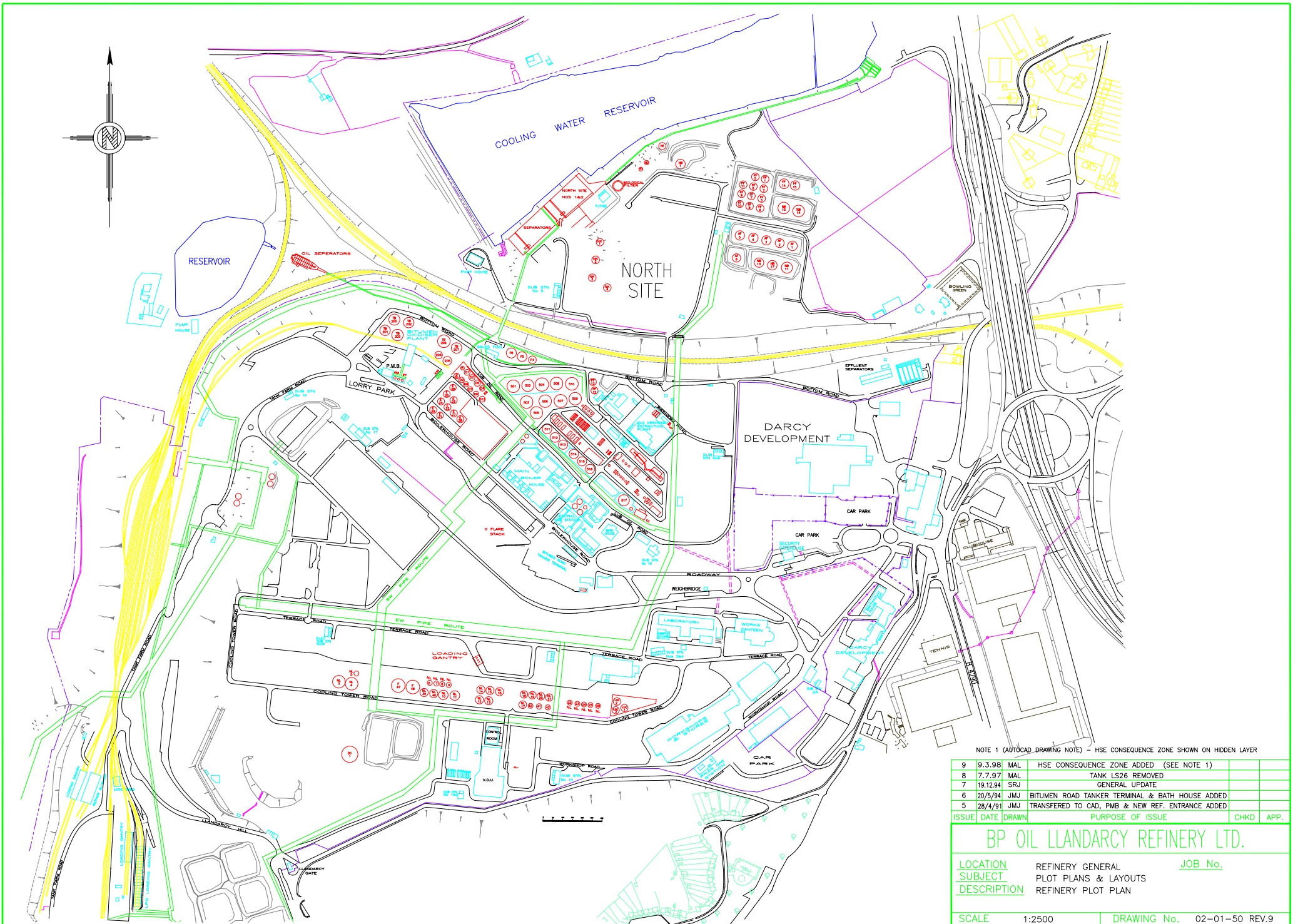
										BP. REFINERY (LLANDARY) LD		JOB No		DA		F.S.		R.G.		CH	
														TR		S.A.		S.A.		CH	
												APP.								APP.	
										UNIT: REFINERY GENERAL		X02-01-76									
										SECTION: SEWERS & DRAINS											
										DESCRIPTION: LAYOUT OF REFINERY - SANITARY & CHEMICAL DRAINAGE.											
R 16.7.71 S.A.C. CHEMICAL DRAINAGE ADDED.																					
15: DATE AMENDMENT										CHK. APP.		SCALE 1/4" = 100 FT.		DRAWING NUMBER 36622		DRAWER NUMBER					



SCALE 3/4" = 100 FEET

100' 50' 100' 200' 300' 400' 500' 600' 700' 800' 900' 1000'

BP. REFINERY (LLANDARCY) LTD		JOB No.	DR. AEW	CH.
		TR.		
		APP.		
UNIT: INDUSTRIAL WATER SERVICES				
SECTION: PLANT PLANS AND LAYOUTS				
DESCRIPTION: REFINERY TENNANT WATER SYSTEM				
		X02-01-124		
IS.	DATE	DR.	APP.	SCALE 3/4" = 100 FT
				DRAWING NUMBER 35027
				DRAWER NUMBER



NOTE 1 (AUTOCAD DRAWING NOTE) - HSE CONSEQUENCE ZONE SHOWN ON HIDDEN LAYER

9	9.3.98	MAL	HSE CONSEQUENCE ZONE ADDED (SEE NOTE 1)		
8	7.7.97	MAL	TANK LS26 REMOVED		
7	19.12.94	SRJ	GENERAL UPDATE		
6	20/5/94	JMJ	BITUMEN ROAD TANKER TERMINAL & BATH HOUSE ADDED		
5	28/4/91	JMJ	TRANSFERRED TO CAD, PMB & NEW REF. ENTRANCE ADDED		
ISSUE	DATE	DRAWN	PURPOSE OF ISSUE	CHKD	APP.

BP OIL LLANDARCY REFINERY LTD.

LOCATION	REFINERY GENERAL	JOB No.
SUBJECT	PLOT PLANS & LAYOUTS	
DESCRIPTION	REFINERY PLOT PLAN	
SCALE	1:2500	DRAWING No. 02-01-50 REV.9

