



CALA Homes (South Homes Counties) Limited

Former West End Nursery, Roundstone Lane, Angmering, BN16 4A

Post Remediation Validation Report – Phase 2B

27621-R11 (00)

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RSK



RSK GENERAL NOTES

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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1 INTRODUCTION

RSK Environment Limited (RSK) was commissioned by CALA Homes (South Home Counties) Limited, hereafter known as the client, to produce a post remediation validation report for Phase 2B (Plots 201 to 307) of the land at the former West End Nursery, Angmering, BN16 4AX.

This report is subject to the RSK service constraints given in **Appendix A**.

1.1 Background

This report details remedial and validation works carried out within the Phase 2B development area, as well as across the wider site.

Validation of the soft landscaping and garden areas (Plots 201 to 307) within Phase 2B is still ongoing, the results of which will be reported to the National House Building Council (NHBC) and the Local Authority as plots/landscaped areas are completed.

Several preceding phases of site investigation and associated risk assessments have been completed for the site by RSK. These are outlined in the following reports:

- RSK, 2015a. Geo-environmental Site Investigation, report ref: 27621 R01 (02), May 2016;
- RSK, 2015b. Additional Geo-environmental Site Investigation and Remediation, report ref: 27621 R02 (00), June 2015;
- RSK, 2016a. Remedial Strategy, report ref: 27621 R03 (02), August 2017 (previous issue 01 dated January 2016);
- RSK, 2016b. Supplementary Geo-environmental Site Assessment, report ref: 27621 R04 (01), June 2016;
- RSK 2016c. Tank Validation, report ref: 27621 L01/ad, August 2016;
- RSK 2016d. Bund Validation Works, report ref: 27621 L02/JR, dated October 2016;
- RSK 2016e. Asbestos Delineation Works Phase 1A – Plots 1 to 19, report ref: 27621 L04/EH, dated October 2016;
- RSK 2017a. Phase 1A asbestos delineation works (Plots 18 and 20 - 64), report ref: 27621 L05/EH, February 2017;
- RSK 2017b. Phase 1B Asbestos Delineation Works (Plots 65 to 121) and Historic Boiler House Validation Works, report ref: 27621-L08-eh, July 2017;
- RSK 2017c. Downgrading of ground gas regime, report ref: 27621-L19-dbj, November 2017;
- RSK 2017d. Post-remediation validation report – Phase 1A, report ref: 27621 R06 (00), May 2017;
- RSK 2018a. Supplementary site investigation and remedial strategy – South east landscaped area, report ref. 27621 R08 (00), January 2018;
- RSK, 2018b. Post-remediation validation report – Phase 1B, report ref: 27621 R09 (00), April 2018;
- RSK, 2018c. Phase 3 Asbestos and Made Ground Delineation Works (northern and western areas), report ref: 27621 L25/EHP, April 2018;

- RSK, 2018d. Phase 3 Supplementary Asbestos Delineation Works, report ref: 27621 L27/CMC, May 2018; and
- RSK, 2019. Post-remediation validation report – Phase 2A, report ref. 27621 R10 (00), February 2019.

It is noted that the remedial strategy report (RSK 2016a) was updated and reissued to the client in August 2017 under reference 27621-R03 (02), to reflect changes in the topsoil to subsoil ratio agreed verbally with the Local Authority since issue of the preceding issue of the report in January 2016, following conveyance queries on this matter, (original reference 27621 – R03 (01), January 2016).

Further to the above, Keltbray Remediation, carried out the first phase of remedial works at the site in accordance with recommendations contained within the RSK remedial strategy (report ref: 27621-R03 (01), January 2016). RSK attended site on an ad hoc basis during Keltbray's first phase of works to provide advice on delineation, waste disposal and to carry out validation when required. The remedial works undertaken by Keltbray were documented in a Completion Report, (report ref: 6033.CR.LH.08072016V3, dated August 2016). It is understood that this report has been submitted to the Local Authority and therefore has not been appended to this report.

The salient findings of the aforementioned works relevant to Phase 2B are included within the following report. However, the report should be read in conjunction with the previous reports listed above, some of those that have direct relevance to Phase 2B are included in **Appendix B** for ease of reference.

1.2 Objectives

The objective of the remediation is to produce a site that is suitable for its intended purposes (residential end use with private gardens and communal soft landscaping), whilst providing a safe working environment with respect to site workers and adjacent users. This will involve the following measures:

- The placement of a suitable clean cover layer within any private gardens and proposed communal soft landscaped areas, locally deepened (to the requirements of the Landscape Architect) in the proximity of any proposed deep root-balled shrubs and/or trees in order to break potential contamination pathways with respect to the underlying made ground;
- Following decommissioning and demolition of the CHP building, nitric acid store, substations and above ground storage tanks (ASTs), in the event that any visually impacted materials are observed, an Environmental Engineer be contacted so that appropriate sampling can be implemented to determine any additional remedial and validation requirements;
- Regrading of bund materials (where required) to form site levels, in accordance with the approved development plan; and to facilitate placement of a 'clean' cover layer across the remaining bund materials. Where possible material won as part of the re-grading exercise will be re-used on site in accordance with a materials management plan following the CL:AIRE Code of Practice;
- Incorporation of gas protection measures within the proposed buildings: structural barrier comprising suspended or ground bearing floor slab with appropriate ventilation and a gas resistant membrane, sealed at all joints and penetrations (please note following further assessment as detailed in Section 1.5.2.2 gas protection measures are no longer required across the site); and

- Compliance with CAR 2012, through the adoption of safe working procedures with respect to the potential presence of asbestos containing materials (ACM) and notification to the HSE.

The objective of this report is to demonstrate that the remedial objectives listed above have been achieved for Phase 2B and that this area of the site is suitable for its intended purposes by:

- Providing a record of validation sampling undertaken post demolition/site clearance, confirming suitability of remaining materials in Phase 2B for the proposed end use (residential);
- Providing a record of validation sampling undertaken post demolition/site clearance, confirming suitability of remaining materials in Phase 2B with regards to soft landscaped areas (central POS, south eastern POS and the north eastern bund); and
- Production of a post-remediation validation report recording all actions taken to implement the remedial works carried out to date: To confirm that remediation goals set out in the remedial strategy report (RSK ref: 27621 R03 (01), January 2016) have been achieved in Phase 2B and identify further works, if necessary.

1.3 Existing Conditions

The site is situated off Roundstone Lane, Angmering, BN16 4AX. The National Grid reference for the site is 507640, 103520 as shown on **Figure 1**. The site covers approximately 11 ha at an elevation of approximately 11 m above Ordnance Datum (AOD) with the exception that along the eastern and western boundaries, there are bunds that rise up above general site level.

The post remedial validation reports for development phases 1A, 1B and 2A (formerly Phase 3) have been approved by the Local Authority and properties in these areas are now occupied. The remainder of the site is currently an active construction site including the area known as Phase 2B containing Plots 201 - 307. All of the aforementioned plots have been founded and are currently being constructed.

Historically the site was arable land up until the construction of West End Nursery circa 1943. The nursery was extended during the 1970's towards the eastern part of the site with the construction of greenhouses.

Redevelopment of the site occurred from the 1990's, with the addition of smaller greenhouse's to the south. Also present from the 1990's were ASTs, a gas governor and laboratory in the south west of the site and a drainage pond in the south east. The laboratory was no longer present on mapping data between 2012 and 2014.

It is understood that the site as a whole is being redeveloped with 244 residential plots comprising a mixture of housing and flats, with private and communal gardens and some areas of communal soft landscaping. The phased development plan for the entire site and Phase 2B are shown within **Figures 2 and 3** respectively.

1.4 Regulatory Correspondence

As part of regulatory consultation process, the client forwarded all reports pertaining to the site to the relevant regulators for review and comment.

Subsequently the remedial strategies for the site have been agreed with the Environmental Health Officer(s) at Arun District Council (RSK 2016a and 2018a).

Since agreement of the remedial strategies the following items, which deviate from the agreed remedial strategies or, are additional to the remedial strategies have been discussed and agreed as specified with the Council:

- A cover layer validation sampling frequency of one sample per 250 m³ in public open space areas has been agreed rather than one sample per 50 m³;
- Topsoil thickness of 150 mm has been agreed as acceptable rather than 300 mm, subject to the overall capping layer thickness of subsoil and topsoil remaining 600 mm in higher risk areas and 450 mm in lower risk areas; and
- Following queries raised by the NHBC regarding the gas membrane design submitted for the site, further gas assessment has been undertaken, as detailed in Section 1.5.2.2. Based on the results of the further assessment, subject to no new sources of ground gas generating material being identified during the remaining works, it has been agreed with the Local Authority and NHBC that gas protection measures are no longer required.

Email correspondence between RSK and Arun District Council in regard to the bullet points listed above are presented in **Appendix C**.

1.5 Method Statement for Remediation of Contaminated Ground

Remedial strategy 27621 R03 (02) (RSK 2016a, August 2017) was based upon previous site investigations findings. Previous investigations found evidence for ACM and/or asbestos fibres in trial pits TP1 to TP9 (all excavated through the bund materials) and within boreholes BH1, BH4, BH12, BH15 and BHE during the initial ground investigations (RSK 2015a, RSK 2015b and RSK 2016b). Elevated concentrations of hydrocarbons and metals were also identified within the bund materials. On this basis, a potentially complete pollutant linkage was identified to human health (construction workers and future residents) from asbestos in soil and elevated concentrations of hydrocarbons and metals.

The second remedial strategy 27621 R08 (00) prepared for the south east landscaped area (RSK 2018a, January 2018) was completed following the discovery of suspected ACM in the bund surrounding the pond in the south east of the site during tree clearance works. Following this discovery, works were ceased in this area and potential risks to construction workers and neighbouring residents mitigated in the short term by damping down and covering with a geo-membrane to prevent potential release of asbestos fibres. RSK subsequently undertook further investigation works in the south eastern portion of the site as reported in RSK 27621 R08 (00) (2018a, January 2018). The investigation found evidence for ACM and/or asbestos fibres in trial pits TP202, TP206-TP208, TP220, TP221 and TP224. Suspected ACM was also encountered in TP212 and TP222, although bulk ID testing was not conducted on materials from these locations. On this basis, a potentially complete pollutant linkage was identified to human health (construction workers and future residents) from asbestos in soils that required supplementary remediation to that specified in preceding remedial strategy 27621 R03 (02), (2016a, August 2017).

1.5.1 Implementation

The remedial strategies for the site (RSK report ref: 27621 R03 (02) and 27621 R08 (00)) were divided into the enabling and demolition phases, i.e. those works required to produce a suitable development platform, and the subsequent construction phase.

The sequence of works required under both phases is outlined in the following bullet points relating to the proposed demolition sequence and the subsequent construction works.

- Before commencing demolition works of the remaining buildings, an asbestos survey suitable for demolition purposes should be undertaken to confirm the presence or absence of ACM within all structures. Where ACM is encountered removal by an appropriately licensed contractor should be undertaken before commencing demolition works. The demolition works (with exception to one building used as a site office) were the responsibility of the vendor prior to handover of the site to our client. As such, no further details are available in regard to whether or not this was completed prior to demolition of the buildings;
- Before commencing demolition of the final building used as a site office an asbestos survey suitable for demolition purposes was conducted by Envirochem in April 2018. None of the samples collected during the survey were found to contain asbestos. A copy of this report is included in **Appendix B**;
- With regards to the removal of the ASTs and substation, live services to these features would need to be isolated/disconnected before removal. In addition the contents of any ASTs and associated pipework should be purged of their liquid contents. The liquid shall be tankered off-site for appropriate disposal by a licensed waste disposal contractor; and
- The existing ASTs, substation and associated pipework, underlying concrete and brick, should be removed under the supervision of a suitably qualified geo-environmental engineer and disposed off-site. Validation of the soils underlying these features, in relation to potential contamination, should be completed at the discretion of the geo-environmental engineer. Validation of the underlying soils is likely to include some or all of the following:
 - Logging of the underlying materials to BS5930 (2015);
 - In-situ screening by a photo-ionisation device;
 - Any materials suspected to be contaminated based on visual/olfactory observations and/or in-situ screening should be stockpiled in areas of impermeable surfacing (hard-standing/on impermeable geo-membrane material). Soil sample(s) should be collected from the stockpiled material and submitted for laboratory analysis to verify its suitability for re-use on-site or off-site disposal; and
 - Any remaining drains or service ducts associated with these features, which have the potential to provide a pathway for contaminant migration should be removed or sealed.
- In accordance with the proposed development plan, sections of the bunds were proposed to be regraded with the removal of the top 1.30 m (approximately). Following agreement from the Local Authority, the excavated materials were to be re-used beneath a clean capping layer in the central public open space (POS) area;
- In the central and south eastern POSs and across the regraded bunds a capping layer to be a minimum depth of 600 mm was subsequently required. The capping materials were proposed to be sourced from natural subsoil won from the central and south eastern POS areas and imported topsoil, underlain by a geo-marker layer;
- Following agreement with the Local Authority, excavated materials from the bunds surrounding the former pond (where required), made ground from the cleared wooded area and other made ground excavated during the development works from across

the site (suitable for re-use at depth), were to be re-used beneath a clean capping layer in the south eastern public open space area.; and

- It was recommended that material movements across the site be controlled through the implementation of a CL:AIRE Code of Practice Material Management Plan (MMP) to demonstrate compliance of the four factors set out therein.

1.5.2 Construction Phase

1.5.2.1 Placement of clean cover soils

In order to break the identified pollutant linkages in Section 1.5.1, within the proposed areas of private gardens and communal soft landscaping areas within Phase 2B the placement of a suitable clean cover layer will be required. To address potential risks posed from the impacts identified in a sustainable manner, the minimum thickness of the clean cover layer is required to be 450 mm in all private gardens, with the exception of Plots 224 and 225 which require a 600 mm capping layer in all private gardens. All areas of communal soft landscaping are required to have a 600 mm capping layer. The 600 mm cover layer should comprise 150 mm of topsoil and 450 mm of subsoil with a geo-membrane marker layer at the base. The 450 mm cover layer should comprise 150 mm topsoil underlain by a 300 mm of subsoil. Throughout the development of the entire site, a 600 mm capping layer has been placed in areas of high risk. These higher risk areas were defined by:

- Areas of identified impact (remaining bund materials, hydrocarbon impacts and made ground containing asbestos), un-investigated areas considered to potentially impacted and the central and south eastern POS landscaped areas containing asbestos impacted materials reused at depth.

The capping layer requirements across Phase 2B are presented on **Figure 4**.

1.5.2.2 Installation of gas protection membranes

It was recommended in the remedial strategy for the site (RSK, 2016a) that a detailed gas membrane installation design and implementation plan be completed in accordance with the recent updates in UK guidance (BS8485:2015).

Following queries raised by the NHBC regarding the gas membrane design submitted for the site, further validation gas assessment in the form of void monitoring was undertaken at the site. RSK initially completed void monitoring for Plots 10, 20, 28, 30, 44, 48 and 50. These plots were chosen due to their proximity to the principal borehole of concern (BH1), other observed sources of potential ground gas generation from the site investigation and to provide suitable coverage of the Phase 1A development area.

Additional void monitoring in Plots 53, 63 and, to a lesser extent, Plot 51 took place to provide an added level of comfort for plots that were due to be occupied as Plots 44, 48 and 50 located in the southern half of Phase 1A were not yet ready for the void monitoring to take place at that time.

The original classification of Amber 1/CS2 was also a belt and braces precautionary approach due to the site history and encountered ground conditions. Whilst not the original purpose of the void monitoring, it quickly became clear that the collection of primary data from beneath existing properties on site was demonstrating that the ground gas regime on the site was presenting itself as a Green/CS1.

Based on the new lines of evidence of significant void monitoring data and further widespread excavation of the development site not encountering significant organic material, RSK considered there was sufficient data to downgrade the site from Amber 1/CS2 to Green/CS1. This has been subsequently agreed by the Local Authority and the NHBC and therefore ground gas protective measures are not required at the site unless any new sources of ground gas generation are discovered during the remaining stages of the development, which is considered to be very low. Supporting correspondence in regard to this is presented in **Appendix C**.

1.5.3 Verification

1.5.3.1 Validation of clean cover soils

In accordance with the remedial strategy reports, validation is required in regard to the thickness and chemical quality of the clean capping layer placed in gardens and areas of communal soft landscaping.

To verify the thickness of the cover layer, it will be necessary to dig through the cover layer at selected locations to verify the required thickness of topsoil, subsoil and presence of the marker layer where required.

In addition, validation samples are to be collected on a 1 in 50 m³ frequency for garden areas and a 1 in 250 m³ frequency in areas of communal soft landscaping as agreed with the Local Authority. All chemical testing for validation purposes is required to be carried out by an MCERTS and UKAS accredited laboratory and the results compared to the relevant validation assessment criteria as set out in the remedial strategy reports (RSK report ref: 27621 R03 (02), August 2017 and 27621 R08 (00), January 2018) and **Table 1**. Should lower SOM be present, the RSK Generic Assessment Criteria (GAC) within **Appendix D** provides alternative criteria for 1 % and 2 % SOM.

Table 1: Validation assessment criteria

Compound	Generic Assessment Criteria (GAC) 6% SOM (mg/kg)
Metals	
Arsenic	37
Cadmium	30
Chromium (III) - oxide	910
Chromium (VI)	21
Copper	2,500
Lead	200
Elemental Mercury (Hg0)	1.2
Inorganic Mercury (Hg2+)	39
Methyl Mercury (Hg4+)	10
Nickel	180
Selenium	258
Zinc	3,900
BTEX Compounds	

Compound	Generic Assessment Criteria (GAC) 6% SOM (mg/kg)
Benzene	0.87
Toluene	680
Ethylbenzene	260
Xylene - m	327
Xylene - o	332
Xylene - p	310
Total xylene	310
Polycyclic Aromatic Hydrocarbons (PAHs)	
Acenaphthene	1,170
Acenaphthylene	970
Anthracene	10,900
Benzo(a)anthracene	13
Benzo(b)fluoranthene	3.7
Benzo(g,h,i)perylene	350
Benzo(k)fluoranthene	100
Chrysene	27
Dibenzo(a,h)anthracene	0.30
Fluoranthene	900
Fluorene	880
Indeno(1,2,3-cd)pyrene	41
Phenanthrene	440
Pyrene	2,040
Benzo(a)pyrene	5
Naphthalene	71
Total Petroleum Hydrocarbons	
Aliphatic hydrocarbons EC ₅ –EC ₆	160
Aliphatic hydrocarbons >EC ₆ –EC ₈	530
Aliphatic hydrocarbons >EC ₈ –EC ₁₀	154
Aliphatic hydrocarbons >EC ₁₀ –EC ₁₂	7,50
Aliphatic hydrocarbons >EC ₁₂ –EC ₁₆	3,500
Aliphatic hydrocarbons >EC ₁₆ –EC ₃₅	79,000
Aromatic hydrocarbons >EC ₈ –EC ₉	56
Aromatic hydrocarbons >EC ₉ –EC ₁₀	189
Aromatic hydrocarbons >EC ₁₀ –EC ₁₂	367
Aromatic hydrocarbons >EC ₁₂ –EC ₁₆	600
Aromatic hydrocarbons >EC ₁₆ –EC ₂₁	800
Aromatic hydrocarbons >EC ₂₁ –EC ₃₅	1,200
Other	
Asbestos	Not observed in asbestos in soil with ID analysis

Compound	Generic Assessment Criteria (GAC) 6% SOM (mg/kg)
Note: if heavy PAH compounds exceed the GAC, benzo(a)pyrene will be used as a surrogate depending upon the heavy PAH compound composition	

2 REMEDIAL WORKS WITHIN PHASE 2B

The remedial works have been carried out in a phased approach as development has progressed at the site.

The following validation and verification requirements were identified as needing to be completed across Phase 2B, prior to this area being deemed suitable for the proposed residential end use:

- Validation sampling following removal of the former electrical sub-station identified during the construction phase;
- Validation sampling in the vicinity of the north eastern bund;
- Validation sampling of the central POS;
- Validation sampling of the south eastern POS;
- Garden and soft landscaping validation sampling and reporting; and
- Post remediation validation reporting for all of the above.

Although not required to be completed in accordance with the agreed remedial strategies for the site to provide the Principal Contractor with further information in regard to asbestos impacts across Phase 2B supplementary site works were completed as detailed in Section 2.1.5.

2.1 Verification Works

Throughout the remedial and construction phase RSK attended site on an ad hoc basis to verify the works carried out. During ground works undertaken in Phase 2B RSK maintained a site presence on a full time to part time basis (2 – 3 days per week), to undertake a watching brief and conduct validation works as and when required. Photographs documenting the remedial and validation works discussed in this report are presented in **Appendix G**.

Further to RSK's presence onsite Economic Insulations (Portsmouth) Ltd. were employed by the Principal Contractor to undertake a watching brief for asbestos during the movement of material suitable for use in the south eastern borrow pit.

2.1.1 Removal and validation of former electrical sub-station

Following the removal of the concrete slab associated with the former electrical sub-station located within the south eastern portion of Phase 2B as detailed within **Figure 6**. RSK attended site on the 6th November and observed no visual or olfactory evidence of contamination present within the soils beneath the slab. In-situ volatile screening using a photo ionisation detector (PID) reported concentrations of between 0.10 – 0.50 ppmV.

A total of one exploratory hole (VSS1) was excavated beneath the concrete slab of the former electrical sub-station, made ground was observed to be 0.90 m in thickness and comprised a mid brown slightly gravelly clay with concrete, brick and chalk, underlain by 0.10 m of River Terrace Deposits. The thickness of the River Terrace Deposits was not proven. Sample descriptions are present in **Appendix F**. Photographic evidence of the above is presented within **Appendix G**.

A total of 2 No. representative samples were taken from the excavation, both directly beneath the slab at 0.10 m and 0.20 m bgl to determine whether the materials required off-site disposal or were suitable for re-use on site. The samples were submitted for laboratory analysis of PCBs, TPH, BTEX and asbestos screen.

The sampling results are presented in **Appendix E**, in laboratory certificate 18/09273/5. Measured concentrations of PCBs were measured less than their respective laboratory limits of detection (LMDL). All remaining results were all found to be below the applicable RSK GAC for residential end use presented in **Appendix D**. Both samples were found to contain loose chrysotile asbestos fibre. Both soil samples returning positive laboratory identification of asbestos were submitted for asbestos quantification analysis. The quantification results for asbestos fibres in soil were <0.001 %.

The agreed cover layer thickness within private gardens associated with Phase 2B was 450 mm clean capping. Following discussions with the client, it was agreed that a 600 mm clean capping layer be placed in the residential front and back gardens within this area associated with Plots 224 and 225. Due to the requirements of a 600 mm capping layer, 600 mm of Made Ground was excavated and placed within the borrow pit located beneath the south eastern POS.

2.1.2 North eastern bund validation works

RSK attended site on the 25th July 2016 to undertake 4 No. hand dug pits (NEBV1 – NEBV4) along the north eastern bund to allow inspection of the subsoil component of the capping layer prior to Keltbray's site works concluding, as reported in RSK letter report 27621 L02, dated 24th October 2016. Four representative subsoil samples were collected during the bund validation works in 2016. All of these were scheduled for metals, asbestos screen, PAHs and TPH CWG. All measured concentrations were below the human health GAC detailed in **Appendix D**, the laboratory results can be found in **Appendix E**, laboratory certificate ref: 16-04624.

In accordance with site level changes, the north eastern bund requires a cut through from the top to the bottom of the bund to allow for the construction of a footpath, to be undertaken by the Principal Groundworks Contractor.

During the construction phase, made ground containing asbestos cement was placed upon the southern portion of the north eastern bund. To date this material has not been removed and as a result the bund requires regrading, the approximate area of the north eastern bund with associated outstanding remedial works is detail highlighted in **Figure 5**.

Following the completion of the clean capping layer, RSK shall reattend site to complete validation inspection pits in this area and report under a separate cover. A temporary fence has been placed around Plots 281 – 301 to prevent access to the remainder of Phase 2B to allow construction works to continue, the approximate location of the fence line is presented on **Figure 3**. Photographic evidence of the above is presented within **Appendix G**. If validation works associated with the north eastern bund have not been completed by the time adjacent plots within Phase 2B require CML sign off, then an additional fence line will be placed across the north eastern bund to prevent access by future residents, the approximate location of the proposed fence line is presented on **Figure 3**. CMLs associated with plots directly adjacent to north eastern bund (Plots 272

– 274 and 235 – 240) will not be passed until the revalidation works of the north eastern bund have been completed.

2.1.3 Validation of the central POS

At the time of reporting the capping layer requirements associated with the central eastern POS have not yet been completed and cannot be validated, the approximate area of the central POS with associated outstanding remedial works is highlighted in **Figure 5**. Following the placement of a clean capping layer, RSK shall reattend site to complete validation inspection pits in this area and report under separate cover. In the interim this area has been cordoned off using herras fencing to prevent access by future residents, the approximate location of the fence line is presented on **Figure 3**. It should be noted that the eastern portion of the central POS contains the site compound which is currently underlain by tarmac hardstanding. A temporary fence has also been around Plots 281 – 301 to prevent access to the remainder of Phase 2B to allow construction works to continue, the approximate location of the fence line is presented on **Figure 3**. Photographic evidence of the above is presented within **Appendix G**.

2.1.4 Validation of the south eastern POS

At the time of reporting the capping layer requirements associated with the south eastern POS have not yet been completed and cannot be validated, the approximate area of the south eastern POS with associated outstanding remedial works is highlighted in **Figure 5**. Following the placement of a clean capping layer, RSK shall reattend site to complete validation inspection pits in this area and report under separate cover.

A temporary fence has been placed around Plots 281 – 301 to prevent access to the remainder of Phase 2B to allow construction works to continue, the approximate location of the fence line is presented on **Figure 3**. Photographic evidence of the above is presented within **Appendix G**. If validation works associated with the south eastern POS have not been completed by the time adjacent plots within Phase 2B require CML sign off, then an additional fence line will be placed along the boundary of the south eastern POS to prevent access by future residents, the approximate location of the proposed fence line is presented on **Figure 3**.

2.1.5 Asbestos within roadway south of Plot 262

In accordance with RSK's watching brief works on-site, several fragments of suspected asbestos containing cement were noted within the vicinity of the roadway (south of Plot 262) during the excavation of the draining route within the roadway as detailed in **Figure 6**. This material was removed, temporarily added to the asbestos stockpile before being placed within the borrow pit in accordance with RSKs remedial strategy, report ref. 27621 R08. As the impacted material was observed beneath the road way no further works were considered necessary.

2.1.6 Clean cover layer placement

Following completion of the groundworks within Phase 2B and in accordance with the remedial strategy, RSK are to validate the placement of a 450 mm thick clean capping layer across all gardens (front and back) within Phase 2B, with the exception of a 600 mm

thick clean capping layer across gardens (front and back) associated with Plots 224 and 225. A 600 mm thick capping layer is also required to be placed across the north eastern bund. Capping layer requirements for Phase 2B are detailed in **Figure 4**.

The soil components 450 mm clean capping are to comprise a minimum of 150 mm topsoil underlain by 300 mm of subsoil. The 600 mm clean capping layer is to comprise a minimum of 150 mm of topsoil underlain by 450 mm of subsoil, place above a geo-marker membrane.

‘Clean’ subsoil is to be taken from the clean stockpile resulting from the Keltbray central POS works or the ‘clean’ stockpile from the Blaze south eastern POS works. To date no such capping layer has been placed within Phase 2B gardens. Upon the placement of a suitable capping layer at individual plots, RSK shall undertake formal validation works to confirm the suitable chemical status and thickness in accordance with the remedial strategy, and the works documented in letter reports for submission to the National House Builders Council (NHBC) and Local Authority.

2.1.7 Health and Safety regarding asbestos within Phase 2B

In accordance with the RSK remedial strategy reports (refs. 27621 R03 (02) and 27621 R08 (00)) the Principal Contractor (Blaze) prepared health and safety risk assessment and method statement documentation (presented in **Appendix H**), pertaining to how potential risks from asbestos in accordance with the control of asbestos regulations (2012) would be managed on site.

The following health and safety methods were put in place onsite to reduce associated health risks and prevent cross contamination between clean and dirty designated areas:

- RSK maintaining a presence to conduct watching brief validation works as and when required;
- Materials locally excavated and tracked across adopted “dirty” route directly to the adopted asbestos stockpile and borrow pit;
- “Dirty” excavator and transporter used. Plant not to be removed from designated dirty area unless jet washed;
- All operatives to be inducted in the health and safety method statement;
- All operatives to have received asbestos awareness training;
- Exposed stockpiles to be dampened down and covered with terram to prevent asbestos fibres becoming airborne; and
- Reassurance air monitoring conducted throughout works undertaken across multiple phases of site works between 16/04/2018 – 20/07/2018, air monitoring results are presented in **Appendix I**.

3 VALIDATION RESULTS SUMMARY WITHIN PHASE 2A

Remedial works at the site are being carried out in a phased approach as the proposed development progresses. The following is applicable to the Phase 2B part of the site as shown on **Figures 2 and 3**.

3.1 Validation within Phase 2B

Investigation works prior to remediation of the site identified asbestos across site (as detailed within Sections 1.1). The following remediation and validation works have been undertaken within Phase 2B:

- Validation of the former electrical sub-station (as detailed in Section 2.1.1); and
- Validation of asbestos in roadway south of Plot 262 (as detailed in Section 2.1.5).

On the basis of the results discussed within Section 2.1.1, a decision was made by the client to place a 600 mm of clean capping layer, underlain by a geo-marker membrane within the front and back gardens of Plots 224 and 225. A 600 mm clean capping layer underlain by a geo-marker membrane is also required across central POS, south eastern POS and north eastern bund of which is yet to be validated (as shown on Figure 5). All remaining plots across Phase 2B require the placement of a 450 mm clean capping layer. The capping layer thickness requirements for the entirety of Phase 2B are summarised on **Figure 4**.

No further remediation or validation works are deemed necessary in Phase 2B, other than the application of the capping layer requirements detailed above.

All garden validation testing data will then be submitted to the NHBC for approval prior to release of any CML's. Once complete the central POS, south eastern POS and north eastern bund validation results shall be submitted to the Local Authority.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based upon the remedial works carried out to date within the Phase 2B, it is considered that the area is suitable for the proposed residential end use, subject to the results of the garden/soft landscaping validation works (including the central POS, south eastern POS and north eastern bund).

RSK are satisfied that the remedial works carried out to date at the site by CALA Homes and Keltbray, have been carried out in accordance with the agreed remedial strategies. In accordance with the agreed phased approach further remediation and validation within Phase 2B, the central and south eastern POSs and the north eastern bund are ongoing at the site.

A temporary fence has been around Plots 281 – 301 to prevent access to the remainder of Phase 2B to allow construction works to continue. Additional fencing has also been placed around the central and south eastern POSs and the north eastern bund until these areas have been validated. CMLs associated with plots directly adjacent to north eastern bund (Plots 272 – 274 and 235 – 240) will not be passed until the validation works associated with the north eastern bund have been completed.

4.2 Recommendations – Phase 2B/POS/north east bund

The following validation and verification requirements need to be completed across Phase 2B, the central and south eastern POS's and the north eastern bund, prior to these areas of the site being deemed suitable for the proposed residential and public open space end uses:

- Re-validation of the central POS area capping materials following placement of further 'clean' site won subsoil to raise levels in this area and imported topsoil;
- Validation of the south eastern POS area capping materials following placement of further 'clean' site won subsoil and imported topsoil;
- Re-validation of the north east bund clean capping layer following installation of cut throughs in accordance with design layout changes (Phase 2B);
- Garden and soft landscaping validation sampling and reporting Phase 2B; and
- Post remediation validation reporting for all of the above in relation to Phase 2B.

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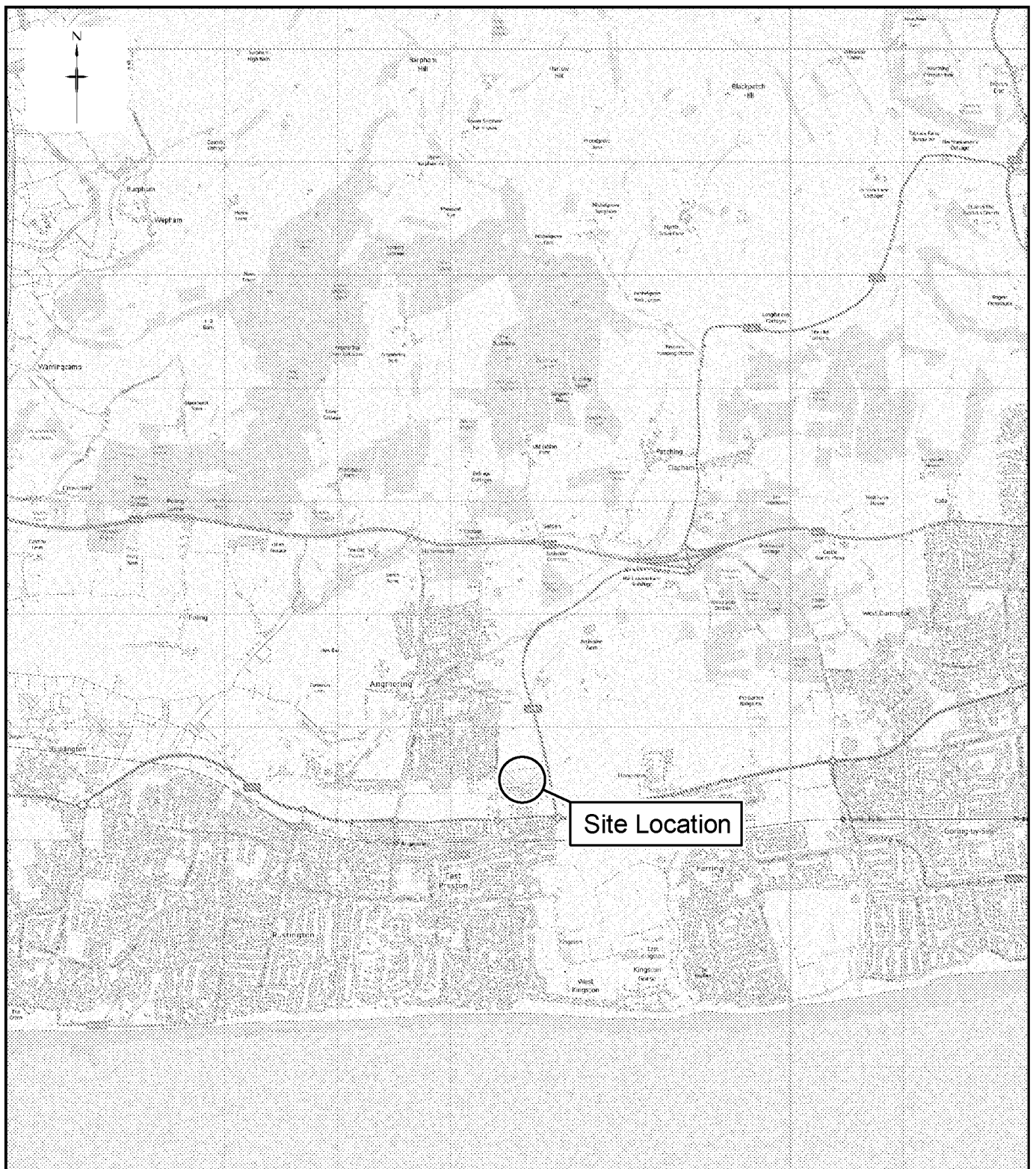
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FIGURES



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Project Title

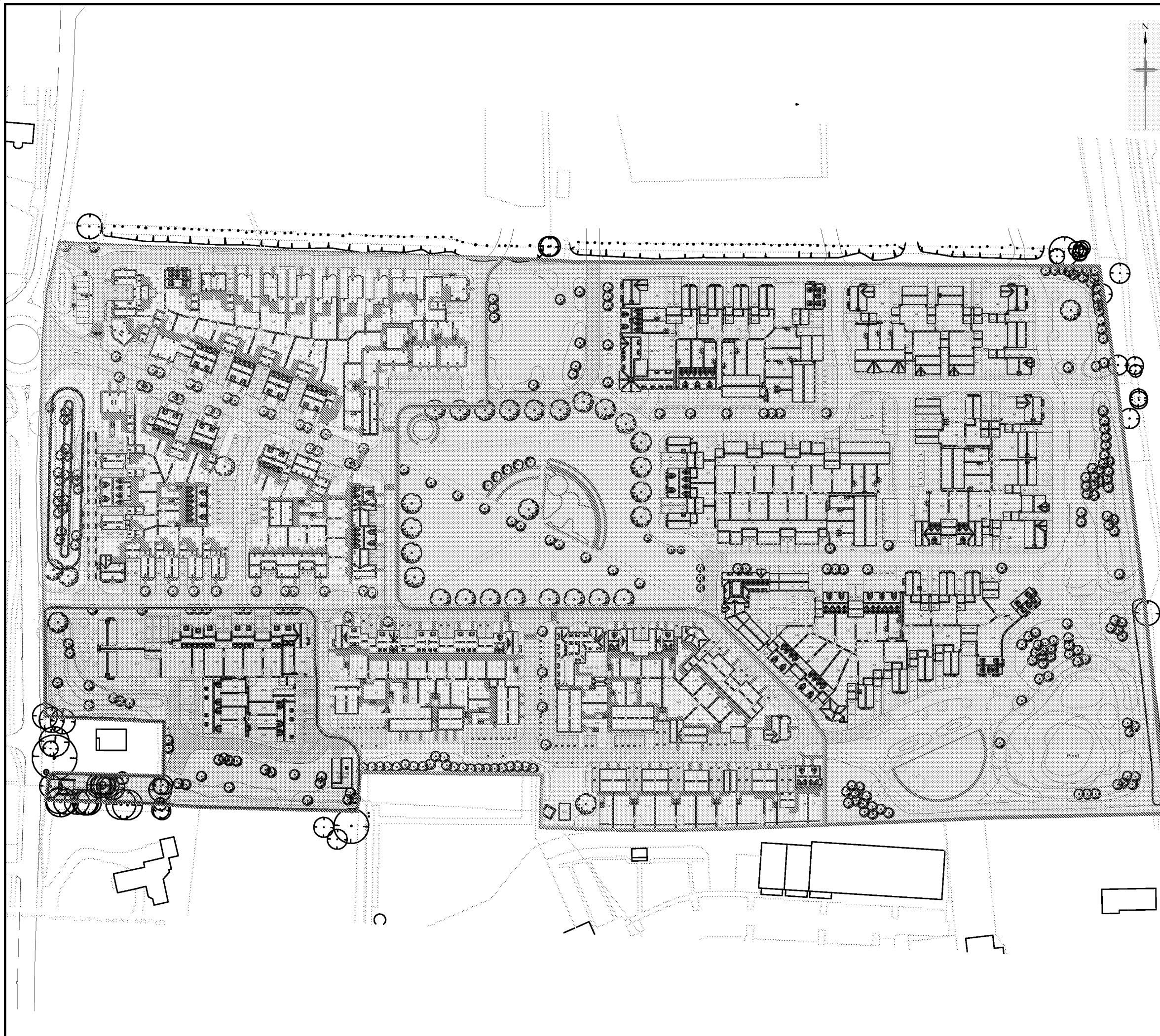
**FORMER WEST END NURSERY,
ANGMERING**

Drawing Title

SITE LOCATION MAP

Rev	Drawn	Date	Checked	Date	Approved	Date
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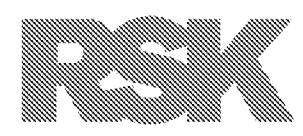
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27621 - R11 (00)	27621 - SLP.dwg	FIGURE 1



LEGEND

- Site Boundary
- Phase 1A
- Phase 1B
- Phase 2A
- Phase 2B

Rev.	Date	Amendment	Drawn	Chkd.	Appd.



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Project Title
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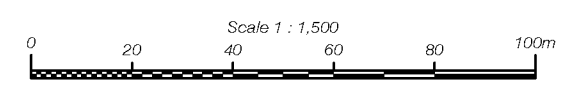
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WHOLE SITE PROPOSED DEVELOPMENT PLAN

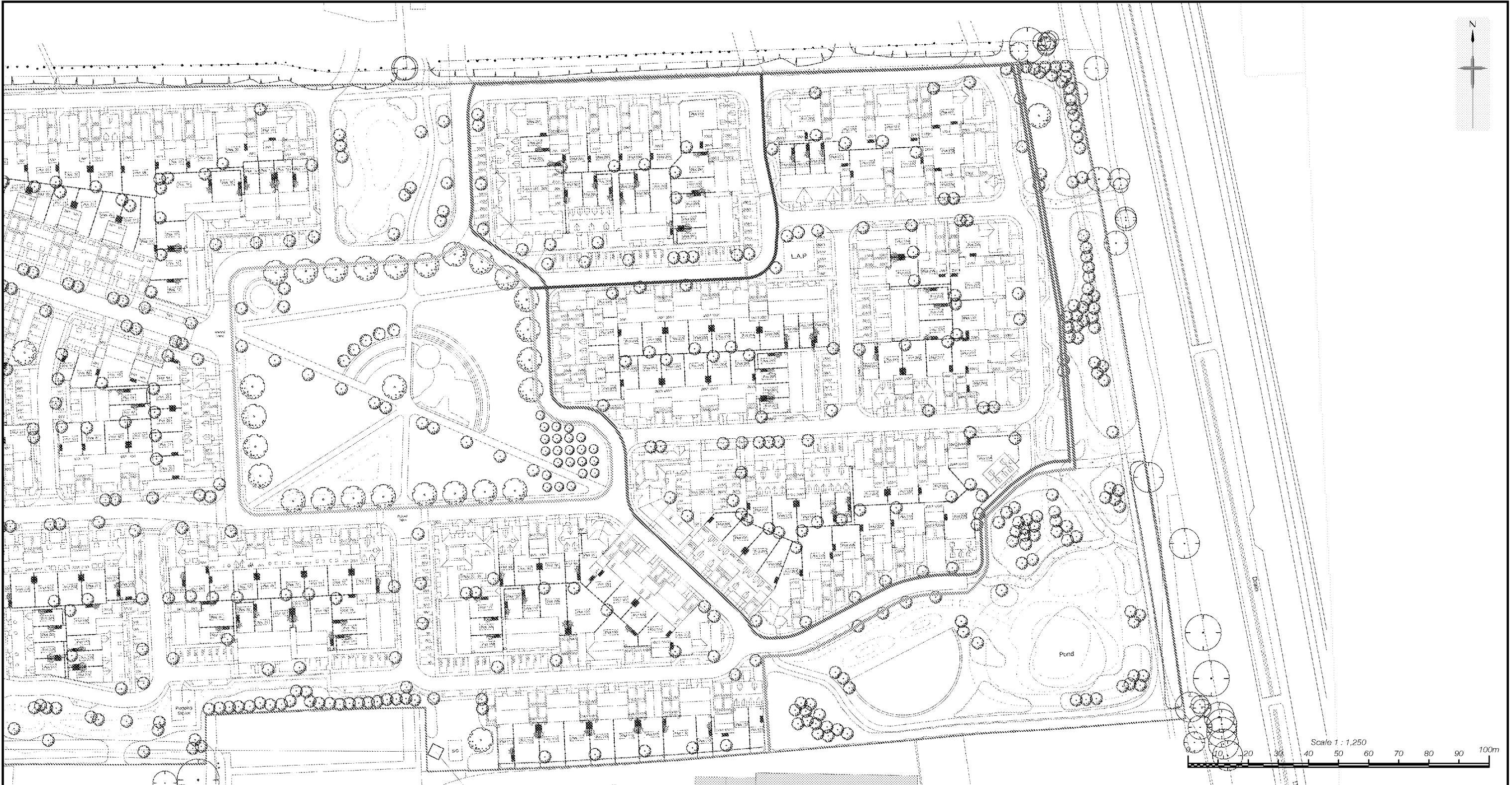
Drawn	Date	Checked	Date	Approved	Date
ASC	28.05.19	JL	28.05.19	CC	28.05.19

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1:1500	A3	m

Project No.	Drawing File
27621 - R11 (00)	27621 (R11-00) Fig 2

Drawing No.	Rev.
FIGURE 2	P1





LEGEND

Phase 2B Site Boundary

Fenced off Plots 281-301

Proposed Fenceline Associated with North Eastern Bund

Fenced off Central POS Area

Proposed Fenced Associated with South Eastern POS Area

Rev.

Date

Amendment

Drawn

Chkd.

Appd.

Scale

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Orig Size

A3

Dimensions

m

Client

CALA HOMES (SOUTH HOME COUNTIES) LTD

Project Title

FORMER WEST END NURSERY,
ANGMERING

Drawing Title

PHASE 2B
LAYOUT PLAN

Project No.

27621 - R11 (00)

Drawing File

27621 (R11-00) Fig 3.dwg

Drawing No.

FIGURE 3

Rev.

P1

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