River Drive, South Shields

Remediation Strategy

For

Galliford Try Partnerships North Ltd

Report Ref	Issue	Prepared by	Date	Reviewed by	Date
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1 INTRODUCTION

1.1 Following the completion of a series of intrusive fieldworks 3e Consulting Engineers Ltd (3e) were commissioned by Galliford Try Partnerships North Ltd to carry out a Remediation Strategy for land located off River Drive in South Shields. The proposed development includes the construction of a new over-55's Apartment Building, with associated car parking and areas of soft landscaping, details of which are provided in **Appendix A**.

1.2 The site, centred on National Grid Reference 436070, 567700, is situated on the corner of River Drive and Palatine Street, South Shields, about 600m north-west of South Shields town centre. A site location plan is included as **Figure 1**.

1.3 The majority of the site is generally managed grassland, although a series of storage garages (lock-up) and associated hard-standing are present across the northern site area. Areas of increased vegetation (bushes and trees) are also present on site adjacent to the southern and eastern boundaries, and forming a line between the grassed area and adjacent garages. Variations in topography can be seen across the site, with a general decrease noted to the north and north-east. An increase in gradient can also be seen adjacent to the southern and western boundaries, adjacent to River Drive and Palatine Street.

1.4 The site is situated within a predominantly residential setting, with housing recorded to the east and south of the site, and a residential apartment block situated adjacent to the northern boundary. Grassed parkland is located to the west of the site, leading down to a boatyard and the River Tyne.

1.5 During the walkover, there was no visual evidence of potential contamination sources noted across the site as a whole. However, an isolated area of 'burning' was noted at the surface across the central eastern site area.

1.6 Both Phase I and Phase II Geo-Environmental Assessment Reports have been completed for this site by 3e. Both of these reports should be read in conjunction with this Remediation Strategy:

- 3e Consulting Engineers Ltd, 'River Drive, South Shields, Phase I Geo-Environmental Assessment' (October 2014). Report Ref: 14643.

- 3e Consulting Engineers Ltd, 'River Drive, South Shields, Phase II Geo-Environmental Assessment' (January 2015). Report Ref: 14643/SI.

2 SUMMARY OF GROUND INVESTIGATION

Site History

2.1 During the late 1800s, a clay pit extended across the southern and central portions of the site, associated with a brick works to the west. Prior to 1941 the clay pit was infilled, and following completion of these works, Allotment Gardens were noted across the southern site area. The allotments were not recorded on historical maps after 1956.

Ground Investigation

2.2 The investigatory work comprised the completion of 8 trial pits, 5 mini-percussive boreholes, and 3 cable-percussive boreholes the installation of gas and groundwater monitoring wells as well as soil sampling together with associated laboratory testing.

Soil Profile

2.3 Made ground was encountered across the site at depths ranging between 0.8m and 18.5m below ground level (bgl) and generally comprised a thin layer of topsoil over black/brown very sandy gravel containing fragments of flint, clinker, sandstone, slag and brick fragments (ash fill).

2.4 The underlying drift deposits generally comprised firm brown and/or grey silty sandy clay overlying firm to stiff sandy gravelly clay deposits. Sandstone bedrock was recorded between 23.0m and 28.5m bgl.

Chemical Screening

2.5 The results of the chemical testing indicated there is a potential risk to human health associated with made ground materials below this site, as described in Section 3 below.

Ground Gas Assessment

2.6 A period of ground gas monitoring has been completed in accordance with CIRIA C665 and the results have indicated that this site falls within a Characteristic Situation 1, suggesting that no gas protection measures are required for the site.

3 CONTAMINATION ASSESSMENT

3.1 Based on the proposed end use being Residential with Home Grown Produce; elevated levels of Polycyclic Aromatic Hydrocarbons (PAH's), Lead and Arsenic have been identified within the made ground present below the site which may potentially represent a risk to the future end users. In addition to this, although no visual evidence of asbestos was noted during the intrusive works, laboratory analysis has identified the presence of asbestos in a single sample of existing topsoil screened from TP05.

3.2 As well as the above, during the walkover an isolated area of 'burning' (former bonfire) was recorded across the surface of the central eastern site area.

Potential risk to human health

3.3 The presence of the identified contaminants pose a risk to human health, requiring mitigation to facilitate the proposed end use.

Remediation Overview

3.4 Due to the presence of the elevated contaminants within the made ground, it has been identified that this presents a potential risk to the future end users and therefore there is a requirement for suitable remedial measures including removal and/or protection measures. These options include:

- Removal of some made ground materials within areas of soft landscaping, as necessary, in order to achieve appropriate levels to place the minimum required 600mm of clean imported capping soil.
- Installation of a clean cover system which will incorporate a minimum of 600mm of clean imported capping soil.
- Within areas where the made ground will be located under buildings or hardstanding, no remediation is required given this will be sufficient to break the pollutant linkage between the site end users and the made ground.

3.5 Within the isolated area of 'burning' (former bonfire) recorded across the surface of the central eastern site area. The following options are proposed:

- Excavation/removal of the burnt material and disposal off-site.
- Capping of the burnt material with clean soils. Given the localised area of material, it likely that removal is the most viable option.

3.6 All materials, if removed from site will need to be taken to a suitably licensed waste facility with copies of waste disposal tickets made available to 3e for the completion of a Validation Report.

4 REMEDIATION STRATEGY

Remediation and Validation Requirements

4.1 The following remediation method statement details a method of working that will ensure the site is left in a condition to ensure no further risk is presented to human health associated with the elevated levels identified.

4.2 The following remedial measures will be required to mitigate against the presence of the elevated contaminants within the made ground:

Importation of clean capping soil

- Any garden or soft landscaping areas will require a minimum of 600mm of clean imported capping soil.

Site Levels

- Excavation/removal of made ground materials within any areas of soft landscaping may be required to achieve site levels for the minimum of 600mm of clean imported capping soil layer.

Area of Burning (former bonfire)

- Excavation of any burnt materials and removed to an appropriate landfill facility.
- Due to the nature of these materials the extent is easily identified by visual inspection.
- Following the removal of these materials it is not considered necessary to validate the area via chemical screening as the this area will also require capping with suitable clean soil as per the strategy above, if it lies within garden or landscaping areas.

4.3 Any materials brought on to site to be utilised within areas of soft landscaping including topsoil, subsoil and granular type materials will require validation testing to confirm the suitability of these materials for use on this site.

4.4 Any service corridors will require backfilling with clean material to mitigate against the risk to maintenance workers.

4.5 If during the groundwork's, any unidentified areas of gross contamination or soils which differ from those encountered during the fieldworks are encountered then these materials will need to be suitably assessed by a geo-environmental engineer from 3e as well notifying the contaminated land and planning officers. If deemed necessary, appropriate remediation shall be carried out.

4.6 All imported materials including topsoil and subsoil should be screened for potential contaminants prior to importation to site using the acceptance criteria for capping soils provided in **Table 1** below.

4.7 Following completion of the remedial works, a Validation Report detailing these works will be completed and submitted to the LA for their comments.

4.8 If any arisings are generated for offsite disposal then they should be stockpiled separately and clearly marked from other materials in order to prevent cross contamination. Offsite disposal tickets should be made available to 3e for use in the Validation Report.

Table 1 – Imported Soil Acceptance Criteria

DETERMINAND	RESIDENTIAL END USE CRITERIA (mg/kg) IN SOIL (1)
Metals:	
Arsenic	37
Cadmium	11
Chromium	910
Lead	450(2)
Mercury	40
Selenium	250
Copper	2400
Nickel	180
Zinc	3700
PAH compounds:	
Acenaphthene	1100
Acenaphthylene	920
Anthracene	11000
Benzo(a)anthracene	13
Benzo(a)pyrene	3.0
Benzo(b)fluoranthene	3.7
Benzo(g,h,i)perylene	350
Benzo(k)fluoranthene	100
Chrysene	27
Dibenz(a,h)anthracene	0.30
Fluoranthene	890
Fluorene	860
Indeno(1,2,3-cd)pyrene	41
Naphthalene	13
Phenanthrene	440
Pyrene	2000
TPH	
Aliphatic EC 5-6	160
Aliphatic EC >6-8	530
Aliphatic EC >8-10	150
Aliphatic EC >10-12	760
Aliphatic EC >12-16	4300
Aliphatic EC >16-35	110000
Aliphatic EC >35-44	110000
Aromatic EC >5-7	300
Aromatic EC >7-8	660
Aromatic EC >8-10	190
Aromatic EC >10-12	380
Aromatic EC >12-16	660
Aromatic EC >16-21	930
Aromatic EC >21-35	1700
Aromatic EC >35-44`	1700
Inorganics:	
Water soluble sulphate	0.5g/l(3)
Acidity (pH)	not less than 5
Asbestos	Presence

Notes:

(1) LQM/CIEH S4UL 2015 guidance value for residential with home grown produce unless otherwise stated
(2) CLEA 1.04
(3) Upper level for Class 1 concrete (BRE Special Digest:2005)
Assessment criteria based on 6% soil organic matter

4.9 Prior to importation to site, soils to be used on site will be tested for the determinands listed in Table 1. The frequency of testing shall be as follows in **Table 2**:

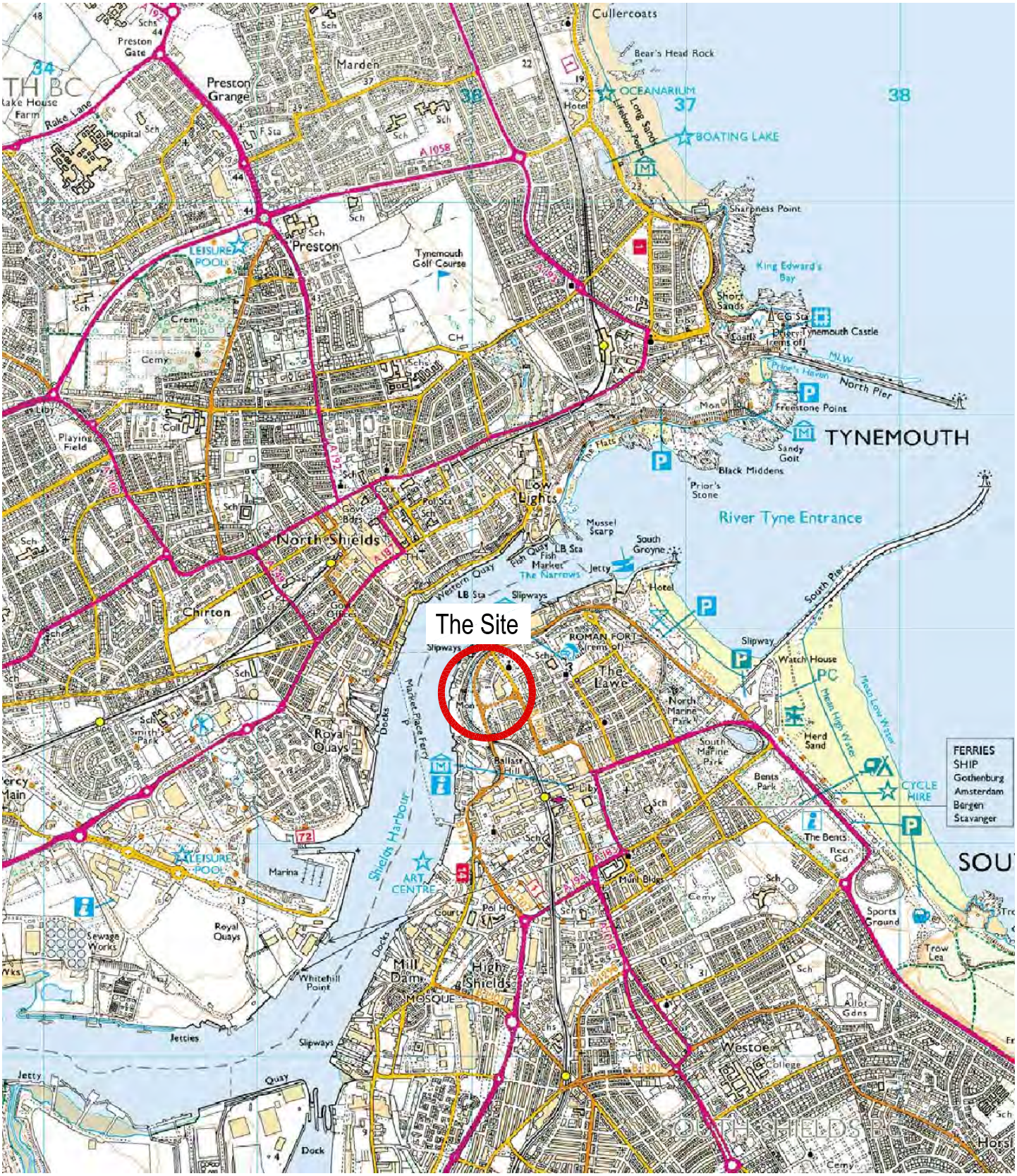
Table 2 – Imported Soil Testing Frequency

Type of material	Frequency of testing	Testing schedule
Crushed hardcore, stone, brick used as capping	Minimum 3 or 1 per 500m^3	• Standard metals/metalloids • Speciated PAHs • Asbestos • Leachate analysis
Greenfield Soils (for garden and landscaping areas)	Minimum 3 or 1 per 250m^3	• Standard metals/metalloids • Speciated PAHs • Asbestos
Brownfield Soils (for garden and landscaping areas)	Minimum 6 or 1 per 100m^3 (whichever is greater)	• Standard metals/metalloids • Speciated PAHs • Asbestos • Banded TPH

4.10 Following placement of the imported capping soils within soft landscaping or garden areas, the thickness of the clean soils will need to be confirmed by a suitably qualified geo-environmental engineer. The number of verification areas should be agreed with the Local Contaminative Land Officer.

4.11 On completion of the works a validation report will be prepared. This will outline the works carried out and include any appropriate waste transfer notes, the results of any necessary validation testing and the validation of the suitability and depth of the imported soils.

Figures



Date	Revision	Checked	Rev.

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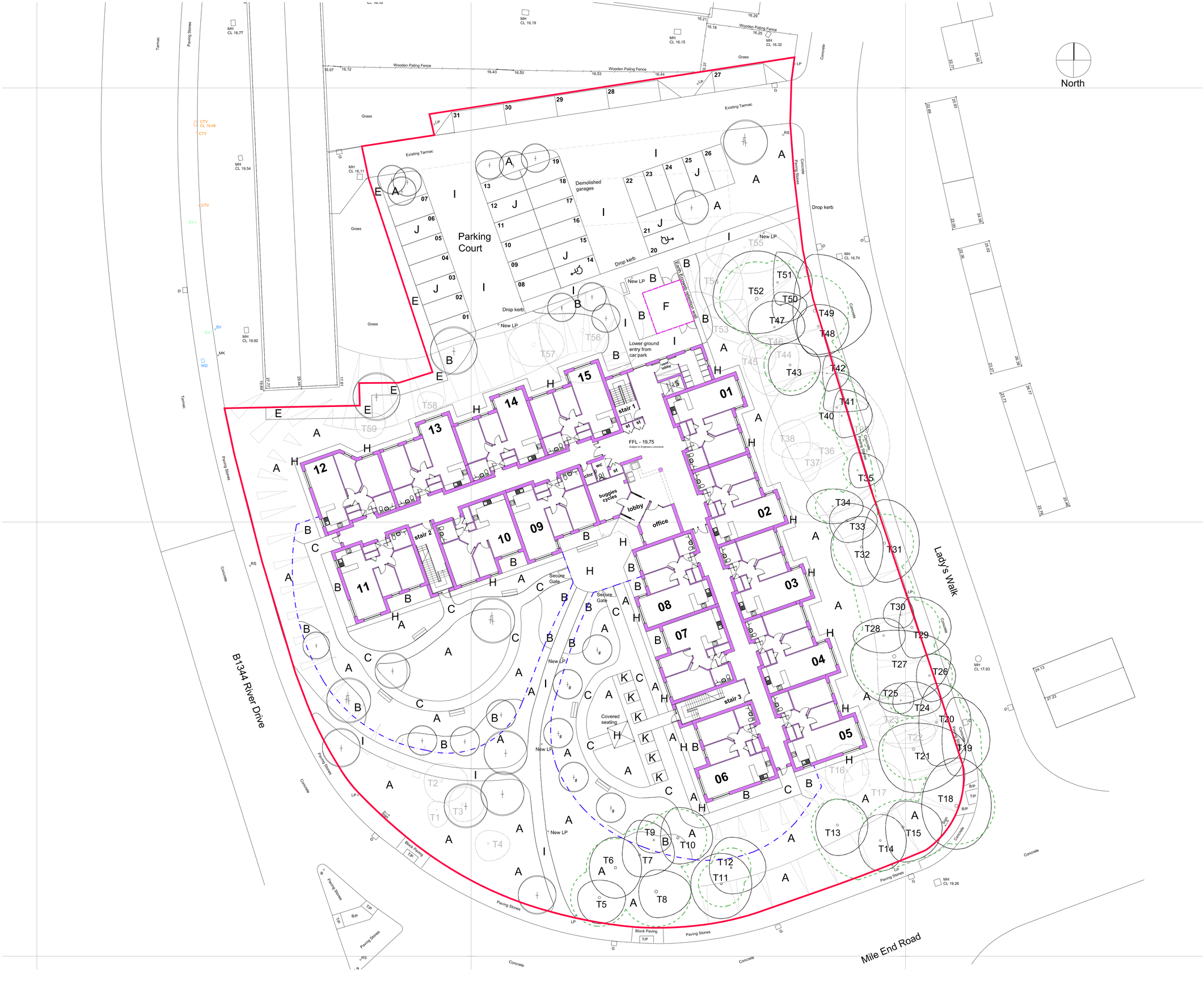
Project	River Drive, South Shields Galliford Try Partnerships North Ltd		
Title	Site Location Plan		
Scale 1:25,000 at A4	Drawn CB	Checked AH	Date Sep '15
Job No. 14643	Drawing No. Figure 1		Rev 0

Appendix A

Proposed Development Plan



NOTES
Do not scale from this drawing. Only figured dimensions are to be taken from this drawing.

Contractor must verify all dimenslons on slte before commencing any work or shop drawings.

Report any discrepancies before commencing work to the Architect. If this drawing exceeds the quantities taken in any way the Architects are to be informed before the work is initiated.

Work within the Construction (Design & Management) Regulations 2007 is not to start until a Health and Safety Plan has been produced by the Principal Contractor

Drawing Status/Type Key:

F - Feasibility stage drawing
P - Planning stage drawing
T - Tender stage drawing
C - Construction stage
AB - As Built Status
TNT - Tenant drawing
SK - Sketch drawing
M - Marketing drawing
L - Landscape Drawing
S - Survey drawing
OS - Ordnance Survey drawing

Rev.	Description	Drawn	Date	Ch'ked	Date

Notes:

A
Grass.

B
Planting.

C
Tarmac Footpath; timber edging.

D
1800mm High Metal Interlaced Bowtop Railings.

E
Hedge

F
External Refuse Store
2000mm High Timer Fence.
Wired close Boarded one side, (Public), with Concrete posts.

G
Proposed Root Protection Areas.

H
Unit Concrete Paving

I
Macadam to adopted requirements

J
Block Paving with car parking demarcation.

K
Raised Beds

NB - Min clear width of gates to be 850mm

New tree
Fruit tree
Existing tree

Site Area
0.57 Hect
1.41 Acres

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PROJECT
River Drive
South Shields
Care Ready Apartments

DRAWING TITLE
Site Layout

Scale	Drawn By
1:200@A1	AM
	Date Drawn: 26.10.14
Checked By	Date Checked

Drawing No.: 13019 / F200
Revision: *