EARTHWORKS SPECIFICATION
BILLET ROAD
ROMFORD
BELLWAY HOMES LIMITED (THAMES GATEWAY)
ES-21912S-22-499
MARCH 2023

AN idom GROUP COMPANY

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Current Document Details

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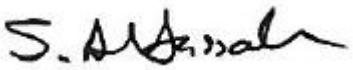

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0	07.12.2022	RJG	SH	DD	
A	1/12/2022	RJG	RJG	RJG	Scope updated in introduction
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SECTION 1 INTRODUCTION

1.1 Bellway Homes Ltd (Bellway) proposes to develop an area of land located at Billet Road, Romford for residential development purposes. The proposed development comprises low-rise residential dwellings with private gardens, apartments, associated infrastructure and areas of public open space.

1.2 IDOM Merebrook Limited (**IDOM**) has been commissioned by Bellway to provide an Earthworks Specification to achieve the formation levels and development platform required for construction of the proposed development.

1.3 The following information has been relied upon in preparing this document:

i. Geo-environmental Assessment – Parcels A and E (ref: GEA-21912s-20-241) dated July 2020 [note: the small field on the northwest of the site has been omitted from the onward development proposals];

ii. Geo-environmental Assessment – Parcel B (ref: GEA-21912s-20-255) dated June 2020; and

iii. Geo-environmental Assessment – Parcel A and B (ref: GEA-21912s-22-173 Rev C) dated March2023.

iv. Detailed Quantitative Risk Assessment and Remedial Method Statement. Billet Road, Romford (ref: RMS-21912s-22-366-RevB) dated March 2023.

1.4 The site investigations revealed ground conditions consisting of variable thicknesses of made ground including anthropogenic topsoil (0.7 – 4.9 m thick) underlain by superficial deposits of Boyn Hill Gravel (0.6 – 5.4 m thick). Below these deposits the London Clay Formation was encountered at depths of between 1.3 and 5.4 m bgl and was proven to the full depth of the deeper boreholes at 20 m bgl. Exploratory holes situated close to the northern, eastern and southern boundaries of the site have revealed the presence of natural soils at relatively shallow depths.

1.5 Some of the exploratory holes encountered significant thicknesses of landfill type materials. These pits tended to be unstable and therefore the maximum depth of the waste deposits was not proven in all cases.

1.6 The made ground materials were highly variable with construction and demolition wastes, but also landfilled industrial, domestic and potentially clinical wastes in places. The landfill generally comprised varying consistencies of black-grey or green-grey sand, gravel and clay. Anthropogenic content comprised brick, concrete, wood, metal (occasional scrap mechanical parts), paper, cardboard, glass and wire. A significant amount of putrescible material was observed within the landfill.

1.7 Numerous exploratory holes encountered visual and olfactory evidence of hydrocarbon contamination, predominantly in the made ground landfill waste deposits.

1.8 Remediation is required to render the site suitable for use. These requirements are set out in the Detailed Quantitative Risk Assessment and Remedial Method Statement and include the following measures:

i. Dewatering of hydrocarbon impacted excavations.

ii. Removal of a drum of bitumen type material from MTP213.

iii. Installation of a Slurry Barrier Wall with Permeable Reactive Section.

iv. Removal of free product where encountered.

v. Ground gas assessment.

vi. Provision of clean cover in areas of soft landscaping.

1.9 Shallow groundwater and inundation of shallow soils has been identified. In order to enable the development land raising is required. Proposed development levels are set out on the RLT Engineering Consultants drawings contained in Appendix 1. Prior to the land raising, items i to iv of the Remedial Strategy (as set out above) must be complete. The RLT drawings also set out the sequencing of the works, which must be adhered to by the Contractor.

1.10 This Earthworks Specification relates only to the land raising. In order to minimise future settlement, ground improvement through surcharging and the installation of band drains is required. The design of the surcharge and band drains (including the drainage blanket) will be the responsibility of the Contractor and is therefore outside the scope of this report, which relates solely to the placement of permanent fill.

1.11 The Earthworks Specification comprises an End Product Specification written in general accordance with the Highways Agency Specification for Highway Works (SHW) publication entitled “Manual of Contract Documents for Highway Works, Volume 1 – Series 600 – Earthworks”. This specification does not constitute a performance specification (*i.e*. the specification does not provide guarantees with respect to final fill performance in terms of allowable bearing pressures for foundations or long-term settlements of fill / structures). Heavy plant and vibration techniques should be employed to cut, move, place and compact material in layers up to the specified platform and road pavement levels in accordance with the Specification and Contract drawings.

1.12 The placed and compacted materials should achieve a minimum state of compaction of at least 95 % of the maximum dry density achieved in the laboratory with a maximum 5 % air voids at the moisture content at the dry limit for acceptability for general cohesive fill.

1.13 The scope of works required to be completed should comprise the following:

i. Demolition of all buildings and structures and removal of foundations and obstructions to their full extent.

ii. Vegetation clearance/management.

iii. Design, enabling and construction of the slurry wall.

iv. Completion of other remedial requirements as set out in Section 1.8.

v. Level raising.

vi. Design and installation of band drains, this must include the drainage blanket and measures to manage water arising from the band drains.

Band drains must be designed to achieve a finished development platform that meets the following requirements:

i. The final platform must achieve a maximum total long-term settlement that will be less than 25mm.

ii. For roads and paved areas, the ground improvement must achieve safe bearing capacity of not less than 60kN/m2 with a minimum CBR value of 5%.

1.14 All works must be completed in accordance with he RLT Phasing plans included in Appendix 1.

1.15 This report has been prepared for Bellway Homes Limited (Thames Gateway) for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Bellway Homes Limited (Thames Gateway) and IDOM as to the extent to which the findings may be appropriate for their use

SECTION 2 THE SITE

2.1 GENERAL

2.1.1 The current subject site is shown in Figure 1 below and excludes the westernmost field that was covered by the reports listed in Section 1.3.

Aerial photography supplied by Getmapping Plc as part of Groundsure Report

Figure 1: Approximate subject site boundary

2.2 SITE HISTORY

2.2.1 Earliest mapping shows Hainault House (with an associated well) present halfway along the northern site boundary adjacent to Billet Road. The remainder of the site appears undeveloped. By the 1990s, mapping shows additional buildings marked around Hainault House.

2.2.2 Satellite imagery shows use of the north-western quadrant of the site for vehicle storage by 1999 and by 2006 it appears that container storage was also occurring.

2.3 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

2.3.1 The site is underlain by drift deposits of the Boyn Hill Gravel Member which is classed as a Secondary A aquifer. Beneath the drift deposits is the solid geology London Clay Formation which is classed as an unproductive stratum.

2.3.2 The site does not lie within an Environment Agency designated groundwater source protection zone and there are no records of active groundwater abstraction within one kilometre of the site.

2.3.3 There are no surface water bodies on the site. There are several small inland drains or streams mapped in the vicinity of the site. These appear to drain westwards towards Seven Kings Water some 425 m west of the site. The Boyn Hill Gravel Member is noted to extend continuously almost as far westwards as the Seven Kings Water, which is itself cut down into the underlying London Clay.

2.4 OTHER ISSUES

2.4.1 The desk study has identified an historic landfill on site, known as 'Hainault House Farm'. According to Environment Agency records included in a Groundsure report, waste was accepted from 1970 to 1973, however, the type of waste accepted is unspecified. There is no evidence of this period of landfilling on the available historic mapping or aerial imagery.

2.4.2 The site is not in a radon-affected area.

2.5 GROUND CONDITIONS

2.5.1 The site investigations revealed ground conditions consisting of variable thicknesses of made ground including anthropogenic topsoil (0.5 – 4.9 m thick) underlain by superficial deposits of Boyn Hill Gravel (0.6 – 5.4 m thick). Below these deposits the London Clay Formation was encountered at depths of between 1.3 and 5.4 m bgl and was proven to the full depth of the deeper boreholes at 25 m bgl. Exploratory holes situated close to the northern, eastern and southern boundaries of the site have revealed the presence of natural soils at relatively shallow depths.

2.5.2 A summary of made ground thicknesses is presented below.

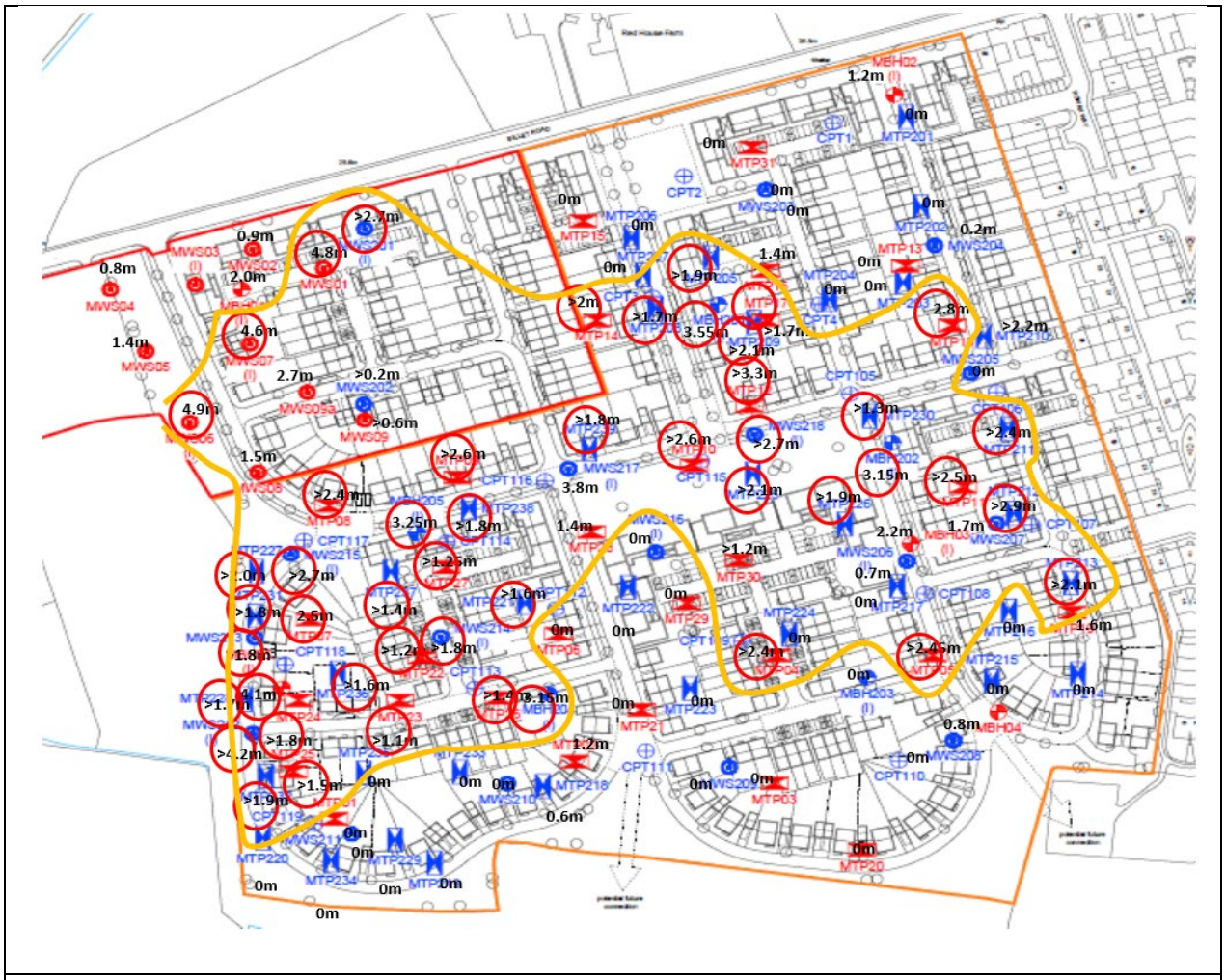


Figure 2: Summary of made ground thickness with inferred extent of landfilled materials outlined in orange. Exploratory holes ringed in red encountered clear landfill waste type deposits.

2.5.3 Some of the exploratory holes encountered significant thicknesses of landfill type materials. The holes with clear landfill waste deposits are highlighted (ringed in red) in Figure 2 above. These pits tended to be unstable and therefore the maximum depth of the waste deposits was not proven in all cases. Figure 2 also includes the inferred boundary of the landfilled waste deposits.

2.5.4 The made ground materials were highly variable with construction and demolition wastes, but also landfilled industrial, domestic and potentially clinical wastes in places. The landfill generally comprised varying consistencies of black-grey or green-grey sand, gravel and clay which were typically recovered as a dark grey slurry with anthropogenic inclusions. Anthropogenic content comprised brick, concrete, wood, metal (occasional scrap mechanical parts), paper, plastic, cardboard, glass and wire. A significant amount of putrescible material was observed within the landfill. There was some evidence of landfill capping materials encountered above

the landfilled waste. This material was highly variable but often comprised gravelly clay with inclusions of brick and flint.

2.5.5 A selection of photographs of the made ground is presented below.

Plate 1: Selection of photographs of made ground and landfilled waste materials from 2020 investigation

2.5.6 Numerous exploratory holes encountered visual and olfactory evidence of hydrocarbon contamination, predominantly in the made ground landfill waste deposits. The landfill capping material was largely free from field evidence of contamination.

2.5.7 Landfilled made ground recovered within MBH202 during the 2022 investigation had a red hue and was contaminated with free-phase product. A pierced drum of bitumen was recovered from MTP213. A selection of photographs is presented below of the gross hydrocarbon contamination encountered at MBH202 and MTP213.

MBH202	MTP213
	
	
	

Plate 2 Selection of photographs of gross hydrocarbon contamination of landfilled waste materials from 2022 investigation

2.5.8 Figure 3 below identifies those exploratory holes where field evidence of hydrocarbon contamination was identified.

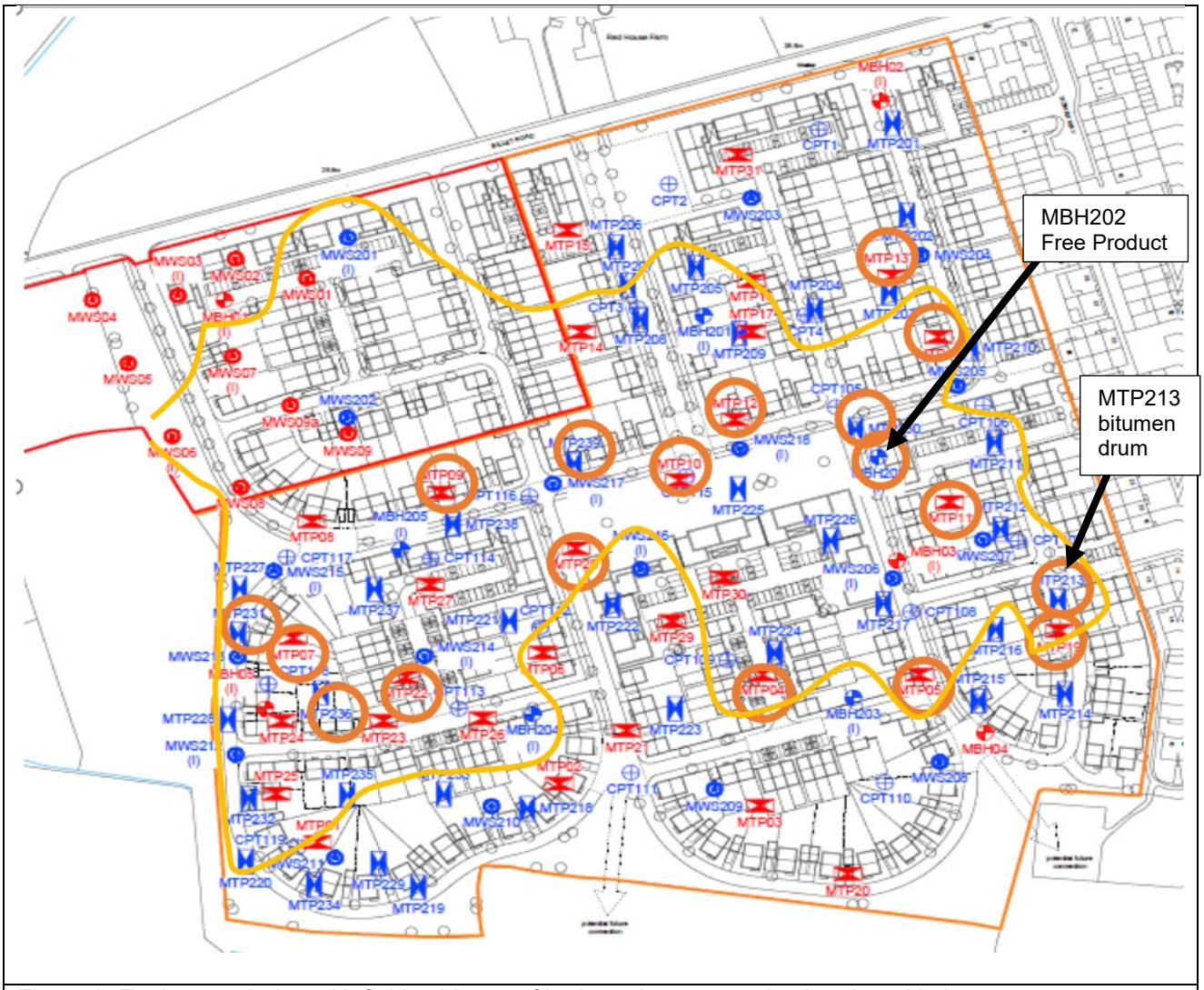


Figure 3: Exploratory holes with field evidence of hydrocarbon contamination ringed in brown

2.5.9 The drift deposits were variably granular and cohesive. Evidence of hydrocarbon contamination in natural ground was limited to a single occurrence of hydrocarbon odour at 1 m bgl, in drift deposits in MTP13 on the northeast of the site just outside the inferred landfill boundary, where made ground was absent. No visual or olfactory evidence of contamination was noted in any of the other exploratory holes in natural strata.

2.5.10 The base of the drift deposits (which are designated as a Secondary A aquifer) was proven in several locations in the deeper boreholes, generally at approximately 4 -5 m bgl. The depth to the top of the London Clay Formation is summarised in Figure 4 below.

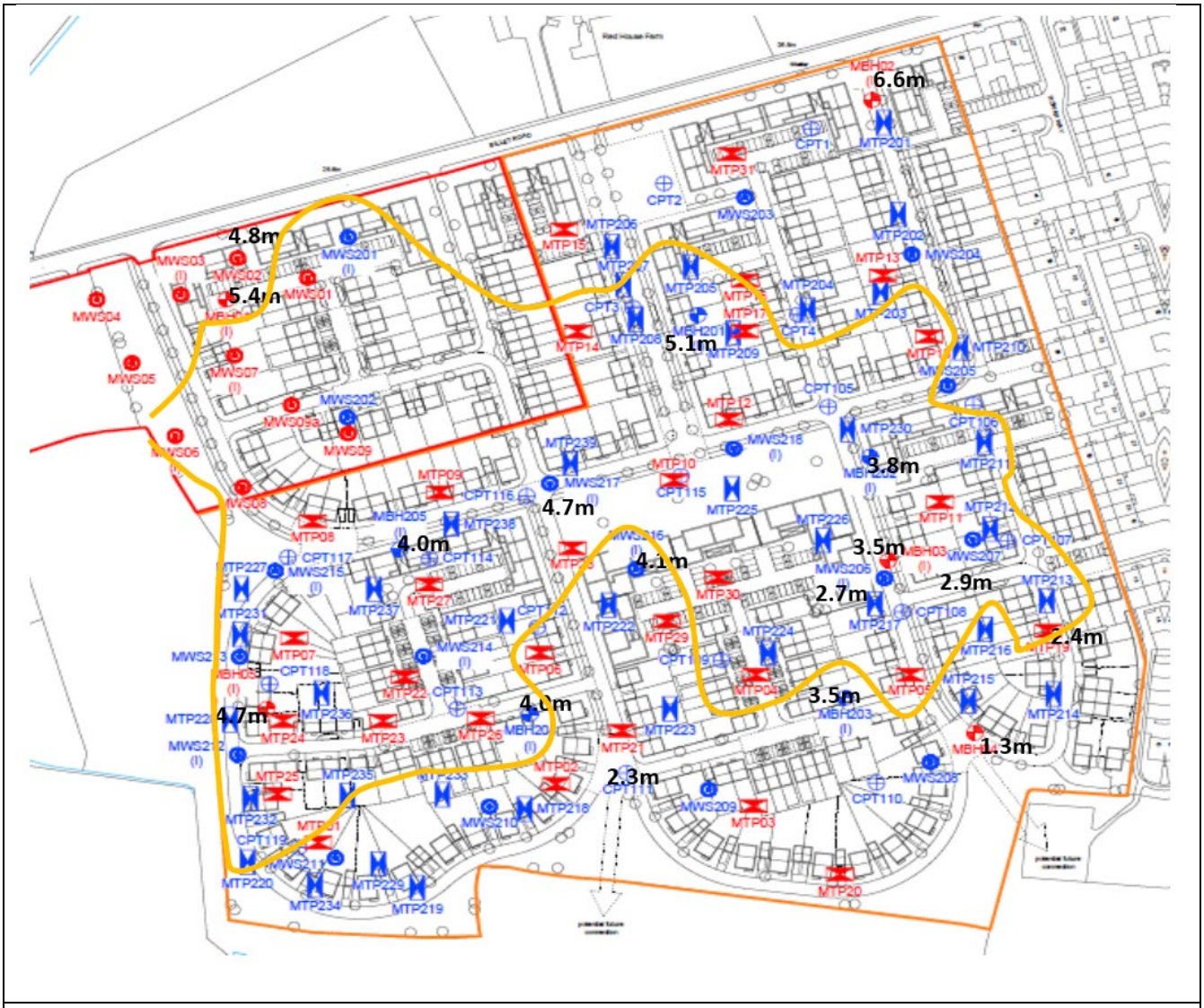


Figure 4: Depth to top of London Clay Formation (where proven)

2.5.11 Whilst there is some uncertainty due to the instability of trial pits and the resulting difficulty in proving the thickness of the waste deposits, it is considered likely that very limited thickness of permeable drift deposits will remain beneath the main landfilled area. This is consistent with the ground conditions identified in the deeper boreholes, where a limited thickness of residual drift was present between the made ground and the London Clay.

2.6 SOIL QUALITY

2.6.1 Tier 1 screening against health risk based generic acceptance criteria appropriate to a residential development type (with allowance for uptake from consumption of homegrown produce) identified limited contaminant species. Following screening of 86 soil samples (from both the 2020 and 2022 investigations) which were tested for a broad suite of contaminants, as informed by desk study and site investigation observations, the shortlist of contaminants of concern was restricted to those listed in Table 1 below.

Table 1: Contaminants of Concern in Soil (Human Health)

CONTAMINANT	UNITS	MAX	SCREENING LEVEL (SL)	No > SL*
Asbestos in soil	-	Detected	Detected	24
pH	-	10.4	5 - 9	12
Cadmium	$mg.kg^{-1}$	13.0	11	1
Lead	$mg.kg^{-1}$	1400	200	23
TPH Aliphatic >EC_{10} - EC_{12}	$mg.kg^{-1}$	220	130	1
TPH Aromatic >EC_{10} - EC_{12}	$mg.kg^{-1}$	580	74	1
TPH Aromatic >EC_{12} - EC_{16}	$mg.kg^{-1}$	480	140	2
TPH Aromatic >EC_{16} - EC_{21}	$mg.kg^{-1}$	310	260	2
Naphthalene	$mg.kg^{-1}$	5.8	2.3	3
Phenanthrene	$mg.kg^{-1}$	150	95	1
Benz(a)anthracene	$mg.kg^{-1}$	52	7.2	9
Chrysene	$mg.kg^{-1}$	40	15	3
Benzo(a)pyrene	$mg.kg^{-1}$	45	2.2	20
Benzo(b)fluoranthene	$mg.kg^{-1}$	44	2.6	20
Dibenz(ah)anthracene	$mg.kg^{-1}$	5.6	0.24	21
Phenol	$mg.kg^{-1}$	11000	120	1

2.6.2 The majority of these exceedances were in made ground associated with the landfilled materials, however, PAH were noted in the upper layer of natural ground in MWS09a at 2.8 m bgl suggesting leaching of contamination from the overlying made ground. At such a depth, this non-volatile contamination is not relevant to health risk assessment for surface receptors.

2.6.3 It is noted that the elevated phenols were associated with the punctured bitumen drum in MTP213.

2.6.4 pH was elevated in 11 samples of made ground (MWS5 (0.5 m), MBH201 (3.0 m), MBH202 (1.5 m), MTP212 (3.0 m), MTP221 (1.3 m), MTP225 (1.6 m), MTP227 (0.7 m), MTP227 (1.5 m), MWS212 (2.9 m), MWS215 (2.5 m) and MWS218 (0.9 m). It is considered this is due to inclusions of cement/concrete. pH was also elevated in a single sample of natural ground (MWS209a (2.8 m)).

2.6.5 Asbestos was detected in 24 samples of made ground in the form of chrysotile and amosite fibres, fibrous debris and hard cement-type material in both shallow made ground and deeper landfill material. The asbestos quantification results are summarised as follows:

i. In the 15 samples (MWS1, MTP5, MTP7, MTP10, MTP208, MTP209, MTP212, MTP213, MTP227, MTP236, MTP228, MTP239, MWS201 and MWS213) where the laboratory reported loose asbestos fibres, the quantification was generally at trace concentrations (< 0.001%) for chrysotile and/or amosite. At MTP228 the quantification was at 0.004%. Sample MTP208 included loose fibrous debris as well as loose fibres;

ii. In the seven samples (MTP7, MTP9, MTP238, MWS212, MWS214, MWS215 and MWS218) where the laboratory reported loose fibrous debris of chrysotile / amosite, the quantification ranged from 0.002 to 0.941 %. Sample MWS218 included cement-type material as well as fibrous debris; and

iii. In the four samples (MBH204 and MTP238) where the laboratory reported hard chrysotile cement-type material, the quantification was at 0.013 to 1.433 %.

2.6.6 Two samples (MBH204 and MTP238) of suspected asbestos containing material (ACM) in the form of cement type material was found to contain chrysotile asbestos.

2.6.7 Figure 5 below highlights those locations where asbestos was detected in made ground.

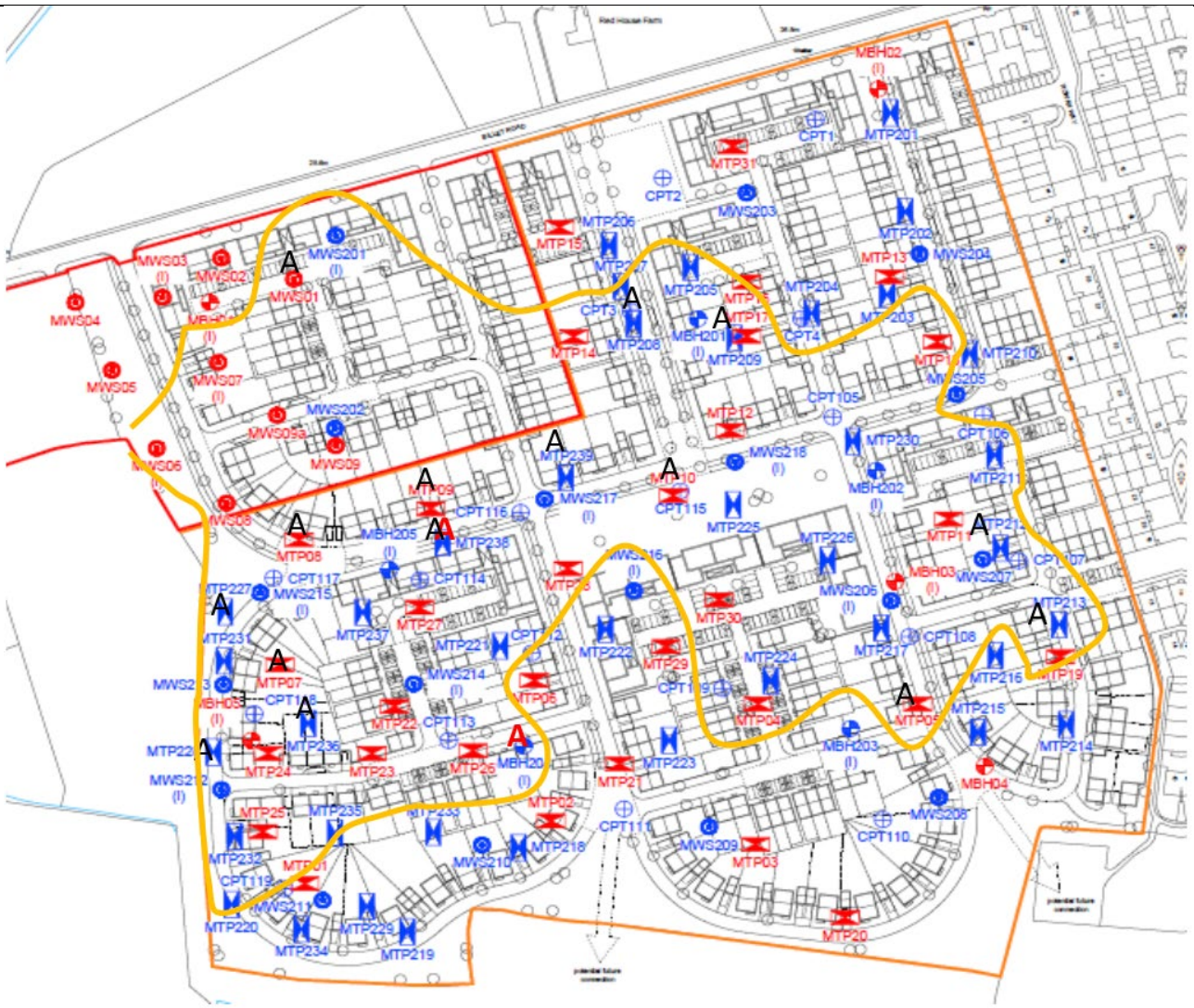


Figure 5: Distribution of asbestos in soils (fragments indicated by red “A”)

2.6.8 Copper and zinc were also noted to be present in excess of screening levels designed to be protective of healthy plant growth in three and 16 soil samples respectively.

2.6.9 The soil chemical data has also been reviewed to characterise any occurrences of hydrocarbon contaminants which are below the health-based screening levels, but which remain relevant to controlled waters risk assessment. A summary of the testing for organic contaminants is presented in Table 2 below.

Table 2: Controlled Waters Risk - organic contaminants

CONTAMINANT	UNITS	MAX	No of Tests
TPH Aliphatic >EC_5 - EC_6	$mg.kg^{-1}$	< 0.001	86
TPH Aliphatic >EC_6 - EC_8	$mg.kg^{-1}$	< 0.001	86
TPH Aliphatic >EC_8 - EC_{10}	$mg.kg^{-1}$	0.028	86
TPH Aliphatic >EC_{10} - EC_{12}	$mg.kg^{-1}$	220	86
TPH Aliphatic >EC_{12} - EC_{16}	$mg.kg^{-1}$	59	86
TPH Aliphatic >EC_{16} - EC_{21}	$mg.kg^{-1}$	160	86
TPH Aliphatic >EC_{21} - EC_{35}	$mg.kg^{-1}$	700	86
TPH Aromatic >EC_5 - EC_7	$mg.kg^{-1}$	0.060	86
TPH Aromatic >EC_7 - EC_8	$mg.kg^{-1}$	0.130	86
TPH Aromatic >EC_8 - EC_{10}	$mg.kg^{-1}$	0.870	86
TPH Aromatic >EC_{10} - EC_{12}	$mg.kg^{-1}$	580	86
TPH Aromatic >EC_{12} - EC_{16}	$mg.kg^{-1}$	480	86
TPH Aromatic >EC_{16} - EC_{21}	$mg.kg^{-1}$	310	86
TPH Aromatic >EC_{21} - EC_{35}	$mg.kg^{-1}$	690	86
Benzene	$mg.kg^{-1}$	0.060	86
Toluene	$mg.kg^{-1}$	0.130	86
Ethylbenzene	$mg.kg^{-1}$	0.410	86
Xylene	$mg.kg^{-1}$	0.286	86
Acenaphthene	$mg.kg^{-1}$	47	86
Acenaphthylene	$mg.kg^{-1}$	4.6	86
Anthracene	$mg.kg^{-1}$	38	86
Benz(a)anthracene	$mg.kg^{-1}$	52	86
Benzo(a)pyrene	$mg.kg^{-1}$	45	86
Benzo(b)fluoranthene	$mg.kg^{-1}$	44	86
Benzo(ghi)perylene	$mg.kg^{-1}$	22	86
Benzo(k)fluoranthene	$mg.kg^{-1}$	25	86
Chrysene	$mg.kg^{-1}$	40	86
Dibenz(ah)anthracene	$mg.kg^{-1}$	5.6	86
Fluoranthene	$mg.kg^{-1}$	84	86
Fluorene	$mg.kg^{-1}$	61	86
Indeno(123-cd)pyrene	$mg.kg^{-1}$	21	86
Naphthalene	$mg.kg^{-1}$	5.8	86
Phenanthrene	$mg.kg^{-1}$	150	86
Pyrene	$mg.kg^{-1}$	80	86
Phenol	$mg.kg^{-1}$	11000	86

2.6.10 The testing of soils for organic contaminants has identified relatively low concentrations of contamination with the exception of a small number of locations. Potential contaminants of concern relevant to the protection of controlled waters are considered to be TPH in the heavier carbon bands (>C_{10}) and potentially PAHs. The

other contaminants (volatile TPHs and BTEX) have not been identified as contaminants of concern based on the soil data. Evidence of gross phenol contamination (11,000 mg/kg) in soil was limited to a single occurrence associated with a punctured drum of bitumen (MTP213 at 1.5 m bgl) and provided this contaminant source is removed as part of the works, then no further assessment of phenol is necessary. Phenol was also detected at much lower concentrations (85 mg/kg) in MBH202 at 1.5 m bgl in association with free product. A discovery strategy is also set out in the RMS.

2.7 GROUNDWATER DISTRIBUTION AND QUALITY

2.7.1 During trial pitting, perched water ingress was noted from variable depths in the made ground from 0.6 to 3.0 m bgl but most frequently at approximately 2 m bgl during the 2020 investigation and somewhat shallower (just over a metre below ground level) in the 2022 investigation. Water ingress was generally absent along the northern boundary of the site. The depths of water strikes in trial pits are presented in Figure 6 below.

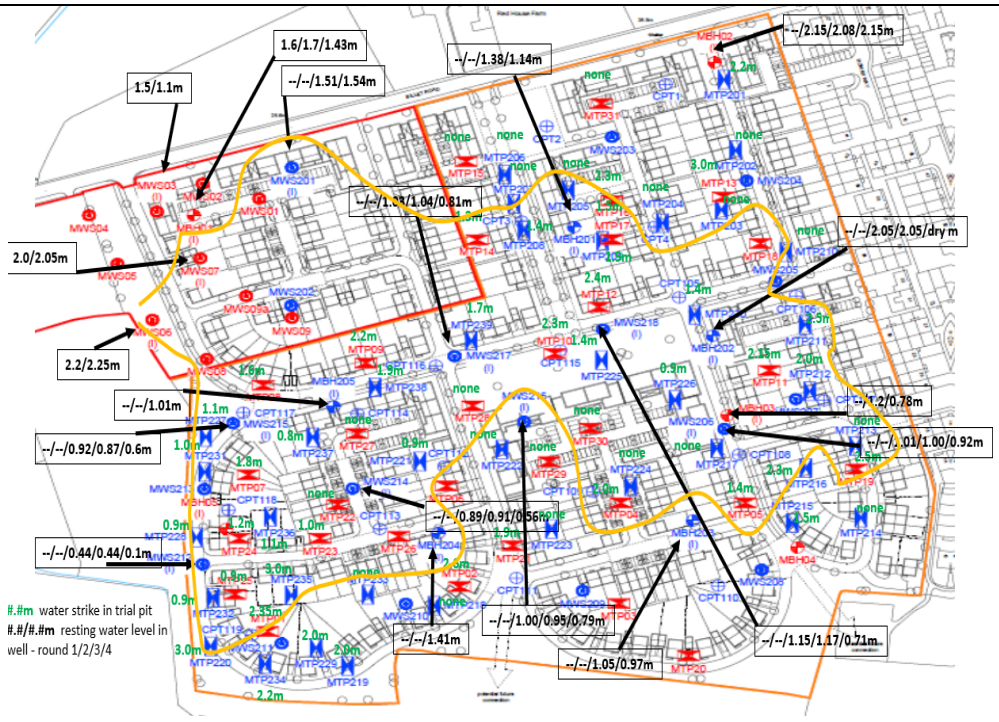


Figure 6: Groundwater distribution

2.7.2 Groundwater strikes were encountered within the Boyn Hill Gravel during the 2022 investigation at depths of 1.2 to 3 m bgl. Groundwater strikes were encountered in the deeper London Clay in the boreholes at depths of 9.8 to 14.3 m bgl.

2.7.3 During subsequent monitoring, resting water levels were recorded at 0.4 – 2.2 m bgl. There is considerable variation in water levels over short distances suggesting that the groundwater distribution is heterogeneous and there does not appear to be a

clearly defined water table. Nevertheless, it is possible that water in the made ground / landfilled waste has some element of local hydraulic continuity with water in the underlying drift deposits, which are noted to have very limited thickness beneath the landfill. It is also possible that water is preferentially standing in the depression formed by the landfilled materials and may have limited mobility away from this feature.

2.7.4 Free product (1 mm thickness) was recorded in MBH202 during both 2022 monitoring rounds. In the other wells, no free product was identified on the groundwater surface and no sheen was observed during water sampling. However, a sheen and evidence of free product was observed in a number of trial pits. The base of the made ground is considered to be saturated in most parts of the site.

2.7.5 Continuous groundwater monitoring has been conducted within three boreholes (MBH201, MBH204 and MBH205) over 19 days. Each of the boreholes was installed with a response zone in made ground/landfill. The data indicates that groundwater levels were subject to a daily cycle, with groundwater across the three boreholes generally fluctuating in the range 10 to 30 mm. In addition to the daily cycle, there was a trend of rising groundwater levels at each borehole during the monitoring.

2.7.6 Groundwater sampling was undertaken as part of the earlier geo-environmental assessments. Contaminants of concern identified in groundwater are set out in Table 3 below.

Table 3: Contaminants of concern in groundwater

CONTAMINANT	UNITS	No of tests	MAX	MEAN	SCREEN LEVEL (SL)	>SL*
Ammoniacal Nitrogen	$\mu g.l^{-1}$	5	33000	1671.7	21	5
Lead	$\mu g.l^{-1}$	23	18	1.917	10	1
Nickel	$\mu g.l^{-1}$	23	35	10.1	20	5
Cyanide	$\mu g.l^{-1}$	23	12	10.11	1	1[b]
Sulphate	$mg.l^{-1}$	23	1390	136.8	250	2
TPH	$\mu g.l^{-1}$	23	3310	236.7	10	9
Xylene	µg.l-1	23	1170.7	53.03	500[a]	1
PAH (total)	$\mu g.l^{-1}$	23	139	13.96	-	-
PAH****	$\mu g.l^{-1}$	23	32.41	1.6	0.1	1
Benzo(a)pyrene	$\mu g.l^{-1}$	23	9.02	0.45	0.27	2
Naphthalene	$\mu g.l^{-1}$	23	18.5	1.6	130	0
Phenols	$\mu g.l^{-1}$	23	1100	503.08	46	3

Notes: * Samples exceeding screen level

** sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene & indeno(1,2,3-cd)pyrene

[a] Screening levels are from Guidelines for drinking water quality - 4th ed. Incorporating first addendum WHO 2017.

[b] The laboratory limit of detection is greater than the screening level.

i. Ammoniacal nitrogen was recorded at concentrations in excess of the screening criteria in all five samples tested to date. The maximum recorded concentration of 33,000 ug.l^{-1} was recorded at MWS215 in the west of the site, with much lower concentrations in the east.

ii. Elevated sulphate concentrations will be taken into account with regard to the potential impact on concrete and dealt with under separate cover in a geotechnical report.

iii. Widespread aromatic TPH in the >C_{10} carbon bands as identified particularly on the west of the site (MWS6, MWS7, MBH1, MBH5, MWS 201, MWS215, MBH201, MBH204 and MBH205). Aromatic TPH >C_{10} concentrations were recorded in the range of 86 to 1750 µg.l^{-1}. Boreholes on the east of the site were unaffected by this contamination with the exception of MBH202 where localised free product was identified (see *iv.* below);

iv. In the vicinity of MWS6 on the northwest of the site, additional contaminants of concern include the aromatic >C_8 – C_{10} band, ethylbenzene and xylene. It appears that a separate, localised source may be impacting this area as the nature of the contamination differs compared to elsewhere on site. In MWS6, aromatic TPH >C_8 was recorded at 3,350 µg.l^{-1} *i.e.* the majority of the contamination (1,600 µg.l^{-1}) was in the >C_8 to C_{10} aromatic band. Ethylbenzene was recorded at 83 µg.l^{-1} and xylenes were recorded at a total of 1,171 µg.l^{-1} with the majority being p- and m- isomers. Aromatic TPH C_{8}-$_{10}$, ethylbenzene and xylene were not detected in the neighbouring wells;

v. MBH202 on the east of the site was affected by the presence of localised free product. Perched water from this borehole included a wider suite of dissolved organic contamination including lighter fractions of aromatic TPH (albeit at relatively low concentrations – TPH Aro C_5–C_{10} at 34 ug/l) and phenol. Whilst the free product is considered as an ongoing source of hydrocarbon contamination, the dissolved phase TPH is of the same magnitude as encountered in the wider impacted waters and so consideration as a separate source is not warranted.

vi. Whilst PAHs have been identified in groundwater, benzo(a)pyrene and the sum of four named PAH in the drinking water standards were below the lower limits of detection in all but two locations. Elevated PAH were present in MBH202 in association with free product and in MWS215. Further action is proposed with regard to removal / management of the free product in MBH202, no PAH contamination was recorded in near-by borehole MWS213, indicating impacts to be localised;

vii. Exceedances of phenol were recorded in four locations. Phenol was particularly elevated in MBH202 at 11,000 ug/l in association with free product. MBH205, located further west (down groundwater gradient), was also affected with 200 ug/l of phenol. There is a data gap between these two wells and it

is unclear whether this phenol contamination stems from distinct sources or represents impact from the same source. Phenol concentrations were generally not significantly elevated in soil samples – with the exception of MTP213 in the south west associated with the drum of bitumen.

viii. Other isolated exceedances of the water quality standards (*e.g.* lead, nickel and cyanide) have been excluded from further assessment as the exceedances are isolated and marginal.

2.7.7 The groundwater contamination distribution is summarised in Figure 7 below.

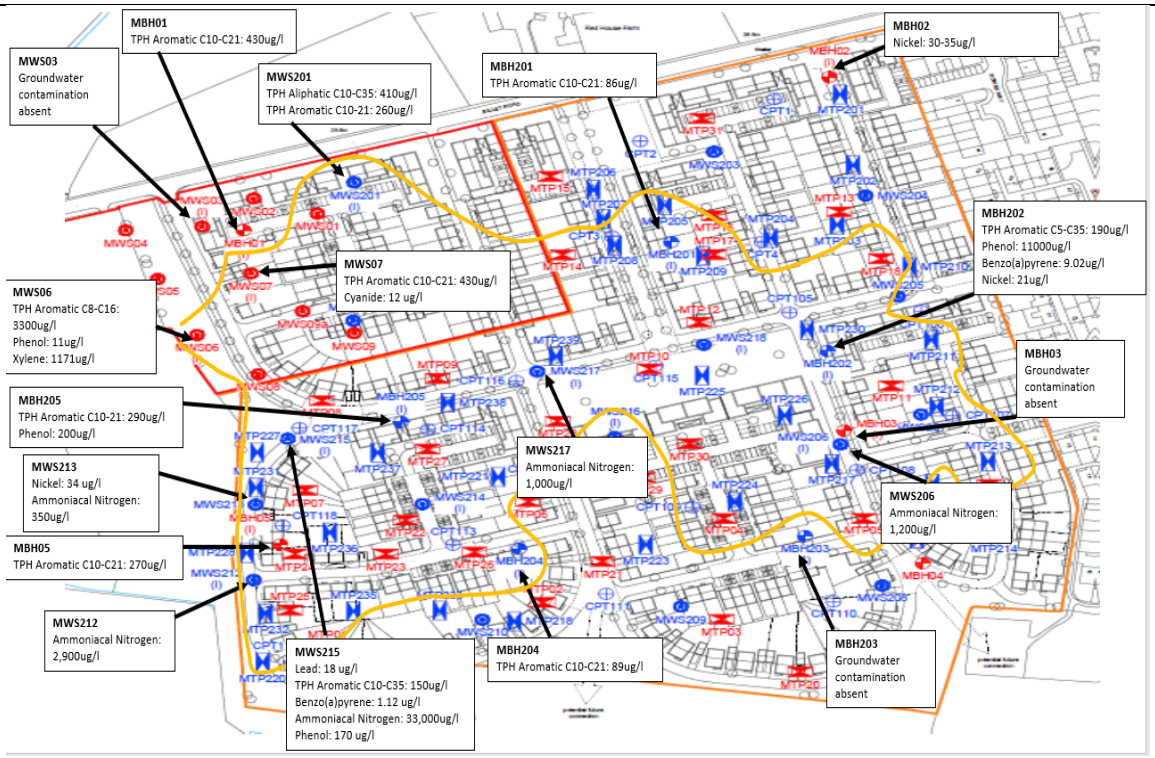


Figure 7: Groundwater contamination distribution

2.7.8 It is not anticipated that earthworks will disturb contaminated soils. However, the Contractor must be aware of the anticipated ground conditions and ensure provision to manage contaminated arisings. This is particularly relevant to the initial site scrape that will potentially expose contaminated soils within the landfill area.

2.7.9 Exposed soils within the landfill areas shall be subject to mitigation measures to prevent dust generation. The contractor should limit clearance activities to minimise the extent of exposed soils to within the working areas and where possible contaminated soils should not be left exposed for more than 48 hours.

2.8 **TRAFFICKING**

2.8.1 In preparing the site for the construction works it is possible that predominantly cohesive soils could be left exposed. The presence of cohesive soils at the surface could possibly lead to poor surface water drainage which could, in turn, impair the movement of plant across the site during the earthworks operation, and surface ground conditions could be worsened during periods of prolonged rainfall. Designated haul routes shall therefore be constructed as appropriate to enable plant and equipment to operate unimpeded. Where applicable, ground improvement, in the form of either capping or geotextile reinforcement, may be required. The movement of dump trucks should be confined as far as possible to these designated temporary haul routes.

SECTION 3 OBSTRUCTIONS AND SLAB REMOVAL

3.1 There is limited building cover and hard standing on site. However, these are located within the landfill area. Strict procedures for the lifting, stockpiling and crushing/removal of the recovered materials are paramount to the successful re-use/disposal of materials to deliver a more cost-effective remedial solution.

3.2 Phased removal of the slab and underlying foundation structures, together with zoning of the site into high-risk areas with respect to hydrocarbon, asbestos, or other contaminant impact, should minimise the risk of cross-contamination of hardcore recovered from the works. Areas of significant contamination surrounding or underlying the slab will be excavated, and soils surrounding substructures will be carefully segregated. Where necessary the surfaces of substructures will be cleaned prior to breaking out and removal to reduce to a practicable minimum the potential for cross-contamination of recovered materials.

3.3 The breakout and segregation of concrete and masonry will be supervised by IDOM Merebrook; materials demonstrating organoleptic evidence of significant contamination will be segregated on being broken out and stockpiled for further assessment. Clean materials will be stockpiled separately for geotechnical classification, processing and reuse. Contaminated materials will be assessed, appropriate treatments carried out and re-used if appropriate. Bituminous surfacing materials originating from hardstandings will be kept separate and can often be recycled.

3.4 The volume of any contaminated hardcore materials will be reduced to a practicable minimum, and these will either be subjected to on-site treatment or, where compliant with applicable Remedial Criteria, will be used as sub-capping fill.

3.5 Obstructions will be removed to their full depth unless otherwise agreed in writing with Bellway or their representative. There is the potential for deeper obstructions, the removal of which may cause destabilisation of the adjacent properties, or the formation of deep voids. Subject to agreement with Bellway and their Engineer, RLT, such obstructions may be left in the ground or only partially removed. In this instance,

their position will be recorded such that the future construction works can be suitably designed, and the obstructions left *in situ*.

3.6 Once obstructions have been removed, material will be backfilled in 200 mm layers and compacted to the Specification for Highways Works: Series 600 Earthworks. Compaction will be carried out using a dozer-towed roller with a minimum of four passes. This may be increased subject to on site geotechnical testing. A banksman will ensure the correct number of passes is carried out to achieve the desired design specification.

3.7 Site won materials will be crushed to a 6F2 for reuse on site.

SECTION 4 VEGETATION CLEARANCE

4.1 Phased removal of vegetation must be undertaken prior to filling. Vegetation removal must be undertaken in a controlled manner to minimise the extent of exposed soils. The Contractor will be responsible for removing and disposing of arisings from the vegetation scrape.

SECTION 5 GEOTECHNICAL CRITERIA & COMPACTION REQUIREMENTS

5.1 GENERAL

5.1.1 The proposed site levels shall be achieved by raising site levels. This will necessitate the import of material. It is anticipated that the surcharge material will also be incorporated into the final development platform.

5.1.2 It is anticipated that soils will be brought to site under an Environmental Permit. As such, fill material must be clean and suitable for use.

5.1.3 All works to construct the permanent platform shall be undertaken to good working practice in accordance with BS 6031:2009 “Code of practice for earthworks”. Earthworks drawings have been produced by RLT Engineering Consultants Ltd (RLT) and are included in Appendix 1.

5.1.4 Where possible, care shall be taken to place different material types separately rather than as a mixed fill. Any fill stockpiles should be weatherproofed to prevent deterioration of the fill (caused either by drying out or wetting up).

5.1.5 Prior to placing material, the Contractor shall ensure that the areas to be filled are free from rubbish, loose soil and standing water. The existing ground level should be proof rolled to identify any soft spots. Any identified soft spots should be excavated to a suitable formation and backfilled using granular starter materials in accordance with the SHW.

5.1.6 No frozen materials or materials containing ice shall be used for filling and fill shall not be placed on frozen surfaces. To prevent ponding of water after the Works, the completed surface levels shall be left at a level that allows a slight fall towards the west to encourage surface water run-off.

5.1.7 The material used in the Works shall be mostly site derived. All materials used in the cut and fill operations must be tested and approved prior to their use on site. The Contractor shall endeavour to make maximum use of all existing site resources and shall only dispose of material off site which is deemed to be unsuitable and cannot be incorporated into any part of the finished Works.

5.1.8 This Earthworks Specification shall be read in conjunction with *'Series 600, Earthworks'*, of the *'Specification for Highway Works'* (SHW) and shall be regarded as *'Appendix 6/1'* to that document.

5.1.9 Appropriate geotechnical testing shall be carried out on all material and the fill classified in accordance with 'Table 6/1' of the 'Specification for Highway Works'. Further detailed acceptance criteria are given in Table 3.

5.1.10 Material considered unsuitable for re-use in any location or part of the site, including landscaped areas shall include the following:

i. Class U2 unacceptable contaminated material;

ii. Landfill waste (from on site);

iii. Peat, logs, tree stumps, topsoil, lignite, slurry and mud;

iv. Material containing biodegradable matter (e.g. domestic waste);

v. Material susceptible to spontaneous combustion;

vi. Material in a frozen condition;

vii. Clay of liquid limit exceeding 85 % and / or plasticity index exceeding 55 %;

viii. Material which cannot be properly compacted (e.g. boulders);

ix. Material with excessive moisture content; and

x. Material from marshes or bogs.

5.1.11 Permitted materials for re-use within the Works are listed in Table 1 below. The end-use for each permitted class of fill shall be in accordance with the details given in Table 4.

Table 4: Permitted Classes of Fill Material for Re-Use

Class	Permitted End Use
1A & 1B	General Granular Fill: All general fill areas.
2A to 2D	General Cohesive Fill: All general fill areas.
4	Landscape Fill: Fill to landscape areas.

Class	Permitted End Use
6B, 6C or 6D	Starter layer: deposited as the first layer or layers of fill above the existing ground level, or if appropriate, above any ground improvement required.
6F1 / 6F2	Capping: Site derived/processed fill to be utilised beneath roadways, for working platforms and other areas of general filling as required. Not to be placed deeper than 1 m below finished levels within building footprints.

5.1.12 It is noted that prior to use any unsuitable inclusions such as oversize cobbles, boulders and obstructions or other deleterious material including, *inter alia*, timber, metal and general construction waste shall first be removed. In addition, it is imperative that careful moisture content control is employed on site such that fill is placed neither too wet nor too dry of the optimum moisture content.

5.1.13 Prior to accepting fill materials for use within the permanent works, geotechnical testing shall be carried out in order to classify the fill type, confirm its acceptability and identify the most appropriate method of compaction. Different material types shall be stockpiled separately and three sets of tests carried out on each discrete material type prior to re-using the material. Should the characteristics of a fill material noticeably alter, it shall be treated as a new source and classification testing repeated.

5.1.14 The tests to be carried out are listed in Table 5. The costs for undertaking all geotechnical testing are deemed to be included in the Contractors price for undertaking the works. The Contractor is to provide weekly updates including the results of the geotechnical testing carried out to IDOM.

5.2 GEOTECHNICAL CLASSIFICATION TESTING

5.2.1 Appropriate geotechnical testing shall be carried out by the Contractor on all material. The fill is to be classified in accordance with *'Table 6/1'* of the *'Specification for Highway Works'* (SHW).

5.2.2 Prior to accepting fill materials for use within the permanent works, geotechnical testing shall be carried out in order to classify the fill type, confirm its acceptability and identify the most appropriate method of compaction. Materials will initially require three suites of testing per source (for imported material) or material type (for site won fill), however, if the tests demonstrate high variability then further testing shall be undertaken.

5.2.3 During the earthworks the required classification testing for each source/type of fill is presented in Table 5 below. Acceptability limits for different classes of fill have been assigned and testing frequency details presented. Should the characteristics of the fill material noticeably alter it shall be treated as a new source and frequency of testing increased.

Table 5: Material Classification Tests (see also Table 6)

TEST	NOTES
Wet Sieve	Granular / Cohesive Fill
Uniformity Coefficient	Granular Fill
Moisture Content	Granular / Cohesive Fill and Chalk
4.5 kg rammer compaction	Cohesive and Chalk Fill
Vibrating rammer compaction	Granular Fill
Atterberg Limits	Cohesive Fill
Particle Density	Granular / Cohesive Fill and Chalk
Saturation Moisture Content	Chalk Fill

5.2.4 A more detailed breakdown of the required compliance testing for each source/type of fill is presented in Table 6. Acceptability limits for different classes of fill have been assigned and testing frequency details presented.

Table 6: Acceptability Criteria and Testing Frequency

Class	Description	Test	Frequency	Limit
1	General Granular Fill	Particle Size Distribution	1 per 1,000 m^3	See SHW Table 6/2
		Moisture Content	1 per 1,000 m^3	Min: OMC –3 % Max: OMC +3 %
		Dry Density / Moisture Content relationship using Vibrating Rammer	1 per 1,000 m^3 or as material visually changes	See Moisture Content
		Particle Density	1 per 1,000 m^3	-
		BRE Sulphate Suite B	1 per 1,000 m^3	-
2	General Cohesive Fill	Particle Size Distribution	1 per 1,000 m^3	See SHW Table 6/2

Class	Description	Test	Frequency	Limit
		Moisture Content	1 per 1,000 m^3	Min: OMC –3 % Max: PL x 1.2, OMC +2 %. See also SHW Table 6/2
		Dry Density / Moisture Content relationship using 4.5 kg Rammer	1 per 1,000 m^3	See Moisture Content
		Atterberg Limits	1 per 1,000 m^3	See above and SHW Table 6/2
		Particle Density	1 per 1,000 m^3	-
		BRE Sulphate Suite B	1 per 1,000 m^3	-
6B, 6C & 6D	Starter layer	Particle Size Distribution	1 per 1,000 m^3	See SHW Table 6/2
		Moisture Content	1 per 1,000 m^3	Min: OMC –3 % Max: OMC +3 %
		Dry Density / Moisture Content relationship using 4.5 kg Rammer	1 per 1,000 m^3	See Moisture Content
		Particle Density	1 per 1,000 m^3	-
		BRE Sulphate Suite B	1 per 1,000 m^3	-
6F1/6F2	Capping	Particle Size Distribution	1 per 1,000 m^3	See SHW Table 6/2
		Dry Density / Moisture Content relationship using vibrating hammer	1 per 1,000 m^3	See Moisture Content
		10% Fines	1 per 1,000 m^3	6F1 >30 kN 6F2 >50 kN

5.2.5 Where within any Class of material, the fill contains material having different maximum dry densities and optimum moisture contents, the Class shall be further sub-divided by extending the identification system to monitor the compacted density.

5.3 PLACEMENT AND COMPACTION OF FILL MATERIALS

5.3.1 Prior to commencing filling operations, the Contractor is recommended to undertake compaction trials on the different classes of fill to be placed in order to establish that the chosen methodology is suitable and adequate compaction is achievable.

5.3.2 Prior to carrying out upfilling, the formation shall be inspected for soft spots. Any soft spots identified should either be proof rolled or removed and replaced with suitable material that adheres to the geotechnical classification set out in Table 6 above.

5.3.3 Before compaction, the Contractor shall inspect the filled surface and ensure that any material greater in size than that outlined in the grading specification of SHW Series 600 Table 6/2 (i.e., material exceeding the maximum permitted size of the grading envelope) is removed. The Contractor shall place fill materials in even layers. Material requiring end product compaction shall be deposited in layers not exceeding 250 millimetres uncompacted thickness. The Contractor shall be responsible for selecting the appropriate plant to achieve the specified compaction for the different classes of fill to be placed. The Contractor shall take due account of all test results available when selecting plant and compaction methods.

5.3.4 Compaction requirements that the Contractor shall be expected to achieve are as detailed below:

i. Class 1 General Granular Fill and Class 6B, 6C or 6D Selected Granular Fill: Shall be sufficiently compacted to achieve at least 95 % of maximum dry density. A minimum CBR of 5 % shall be achieved at road formation level; and,

ii. Class 2 General Cohesive Fill : Shall be sufficiently compacted to achieve at least 95 % of maximum dry density as measured in the laboratory, a maximum air void content of 5 % at a moisture content at the dry limit for acceptability and a minimum undrained shear strength of 50 kN/m^2. A minimum CBR of 3 % shall be achieved at road formation level.

5.3.5 In order to ensure that compaction has been carried out to a satisfactory standard, End Product compaction compliance testing shall be performed by the Contractor during the earthworks operation as filling proceeds and on the new site profile. Validation testing must be programmed to ensure that sufficient tests are carried out on each compacted layer.

5.3.6 End Product compaction compliance testing shall be carried out in accordance with BS1377 part 9 (1990). Testing shall be carried out at the frequency outlined in Table 7 below:

Table 7: In-situ testing requirements

Test	Notes	Frequency
In situ hand shear vanes	Cohesive soils only. Each layer of placed fill.	1 per 50 m^2 grid square per material type, with a minimum of one per grid square.
Nuclear Density Gauge Tests and associated laboratory calibration testing	Each layer of placed fill	1 per 50 m^2 grid square per material type, with a minimum of one per grid square.
In situ CBR tests	Principally beneath roadways	1 per 100 m^2 grid square per material type within the top three layers.

5.3.7 Tests should be performed on different Classes of material. If more than one Class of material is being used in such a way that it is not practicable to define the areas in which the Class occurs, the in-situ testing will be compared to the materials requiring the greater compactive effort.

5.3.8 If weather / site conditions are such that the specified moisture content values given in Table 6 cannot be achieved the Contractor shall cease works.

5.3.9 The Contractor shall ensure that the moisture contents of the fill materials are consistent with the values given in Table 6. A decision as to whether the material needs to be wetted / aerated will be based on the values given in Table 6 and an assessment of the moisture content – plastic limit relationship in respect of cohesive materials. This may result in some delays in the fill operations to allow aeration or, if the material is too dry, to allow sprinkling and harrowing to ensure the material placed has a moisture content within the range specified in the table.

5.3.10 No fill shall be placed and left uncompacted at the end of a working day. Compacted fill shall be graded to falls to ensure free run-off of rainwater without ponding. The Contractor shall maintain all excavations and fill areas free from standing water and shall provide all necessary pumps, including groundwater treatment facilities, to achieve this requirement.

5.3.11 Where rainfall has degraded the fill surface between successive filling events, the Contractor shall ensure that the surface is bladed to remove the soft uppermost layer of material and / or any soft spots before recommencement of filling. The bladed surface should be proof rolled prior to placement of the succeeding layer.

5.3.12 Where, during the progress of the Works, the difference in level between adjacent areas of filling exceeds 500 mm, benches having a minimum width of 500 mm and a height equivalent to the depth of the layer of compacted fill shall be cut into the higher ground.

5.4 REUSE OF SITE-WON MATERIAL

5.4.1 Site-won material from the completed platform will be suitable for reuse on site as sub-capping fill provided it adheres with the geotechnical criteria set out in Section 3 above and is free from gross contamination. Landfill material cannot be reused in the works.

5.5 CONTAMINATED GROUNDWATER

5.5.1 Contaminated waters arising from excavations shall be disposed of in accordance with the following;

i. A trade effluent consent granted by agreement with the sewerage undertaker; or,

ii. An alternative appropriate means determined by the Contractor (such as tanker).

5.5.2 Adequate provision shall be made by the Contractor for the appropriate storage or treatment of contaminated waters on site.

5.5.3 Groundwater shall not be used for dust suppression.

SECTION 6 VALIDATION PROTOCOLS

6.1 INTRODUCTION

6.1.1 This section sets out the validation protocols to be employed during the works.

6.2 SPECIFICATIONS FOR IMPORTED FILL MATERIALS

6.2.1 Materials imported as general fill to be used below the clean capping will be required to meet the chemical specification set out in Table 8 below.

Table 8: Acceptance Criteria for Imported General Fill

CONTAMINANT	UNITS	Acceptance Criteria ALL AREAS
Anthropogenic inclusions	-	absent
Asbestos in soil	-	none
pH	-	5 – 9
Arsenic	$mg.kg^{-1}$	37
Cadmium	$mg.kg^{-1}$	11
Chromium (total)	$mg.kg^{-1}$	910

CONTAMINANT	UNITS	Acceptance Criteria ALL AREAS
Hexavalent Chromium	$mg.kg^{-1}$	6
Lead	$mg.kg^{-1}$	200
Mercury	$mg.kg^{-1}$	40
Nickel	$mg.kg^{-1}$	180
Selenium	$mg.kg^{-1}$	250
TPH Aliphatic >EC_5 - EC_6	$mg.kg^{-1}$	1000* (SL capped to protect amenity)
TPH Aliphatic >EC_6 - EC_8	$mg.kg^{-1}$	
TPH Aliphatic >EC_8 - EC_{10}	$mg.kg^{-1}$	
TPH Aliphatic >EC_{10} - EC_{12}	$mg.kg^{-1}$	
TPH Aliphatic >EC_{12}	$mg.kg^{-1}$	
TPH Aromatic >EC_5 - EC_7	$mg.kg^{-1}$	
TPH Aromatic >EC_7 - EC_8	$mg.kg^{-1}$	
TPH Aromatic >EC_8 - EC_{10}	$mg.kg^{-1}$	
TPH Aromatic >EC_{10} - EC_{12}	$mg.kg^{-1}$	
TPH Aromatic >EC_{12} - EC_{16}	$mg.kg^{-1}$	
TPH Aromatic >EC_{16} - EC_{21}	$mg.kg^{-1}$	
TPH Aromatic >EC_{21}	$mg.kg^{-1}$	
Benzene	$mg.kg^{-1}$	0.087
Toluene	$mg.kg^{-1}$	130
Ethylbenzene	$mg.kg^{-1}$	47
Xylene	$mg.kg^{-1}$	56
Acenaphthene	$mg.kg^{-1}$	210
Acenaphthylene	$mg.kg^{-1}$	170
Anthracene	$mg.kg^{-1}$	1,000*
Benz(a)anthracene	$mg.kg^{-1}$	7.2
Benzo(a)pyrene	$mg.kg^{-1}$	2.2
Benzo(b)fluoranthene	$mg.kg^{-1}$	2.6
Benzo(ghi)perylene	$mg.kg^{-1}$	320
Benzo(k)fluoranthene	$mg.kg^{-1}$	77
Chrysene	$mg.kg^{-1}$	15
Dibenz(ah)anthracene	$mg.kg^{-1}$	0.24
Fluoranthene	$mg.kg^{-1}$	280
Fluorene	$mg.kg^{-1}$	170
Indeno(123-cd)pyrene	$mg.kg^{-1}$	27
Naphthalene	$mg.kg^{-1}$	2.3
Phenanthrene	$mg.kg^{-1}$	95
Pyrene	$mg.kg^{-1}$	620
Phenol	$mg.kg^{-1}$	280
Phytotoxins	**Units**	
Copper	$mg.kg^{-1}$	200
Nickel	$mg.kg^{-1}$	110
Zinc	$mg.kg^{-1}$	300

Note: *Values capped at 1,000 mg/kg.

6.2.2 Validation testing shall be carried out at a rate of one sample per 1,000 cubic metres. Testing frequencies will reduce to one sample per 5,000 per cubic metres for a single source with consistent properties and data (greater than 5,000 cubic metres per source).

6.3 OFF-SITE WASTE AND RECYCLING

6.3.1 It is anticipated that the following surplus materials will be removed from site as a result of the works:

i. Miscellaneous segregated rubbish materials to be disposed of at landfill.

6.3.2 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statues including the *Environmental Protection Act 1990*, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The List of Wastes Regulations 2005* as amended, *The Hazardous Waste Regulations 2005* as amended, *The Waste Management Regulations 2006* and *The Environmental Permitting Regulations 2010* as amended.

6.3.3 It is a requirement of these regulations that waste sent to landfill should have been subject to measures to reduce the amount of waste, reduce harmful or hazardous properties and facilitate recycling. These requirements are likely to be satisfied by the measures already undertaken on site which will include segregation and screening of wastes to recover suitable fill and material for crushing, segregation of inert materials and putrescible wastes.

SECTION 7 ENVIRONMENTAL CONTROLS

7.1 The Contractor must ensure suitable controls and monitoring are in place to prevent harm to the surrounding environment. A Construction Environmental Management Plan will be produced by Bellway. This will set out the framework for these measures and outline the necessary controls.

SECTION 8 GENERAL SITE PRACTICES

8.1 Materials including clean waste soils, *inter alia* those from excavations for services and foundations, which are not to be retained or re-used should be removed and disposed of in accordance with all relevant statutes including the *Environmental Protection Act 1990*, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The List of Wastes Regulations 2005* as amended, *The Hazardous Waste Regulations 2005* as amended, *The Waste Management Regulations 2006* and *The Environmental Permitting Regulations 2010* as amended.

8.2 Potential risks to construction workers have been identified with regard to asbestos contamination. The adoption of appropriate Health and Safety procedures will ensure that risks to operatives from hazardous materials at the site are minimised. Dust levels must be kept within statutory limits (e.g. by damping down in dry conditions including stockpiles and exposed soils).

8.3 Operatives should not be allowed to eat, drink or smoke on site except in designated areas and should be required to wash all exposed skin at the end of each shift. Operatives should be informed of the potential hazards at the site and should be required to report any observations of suspect materials.

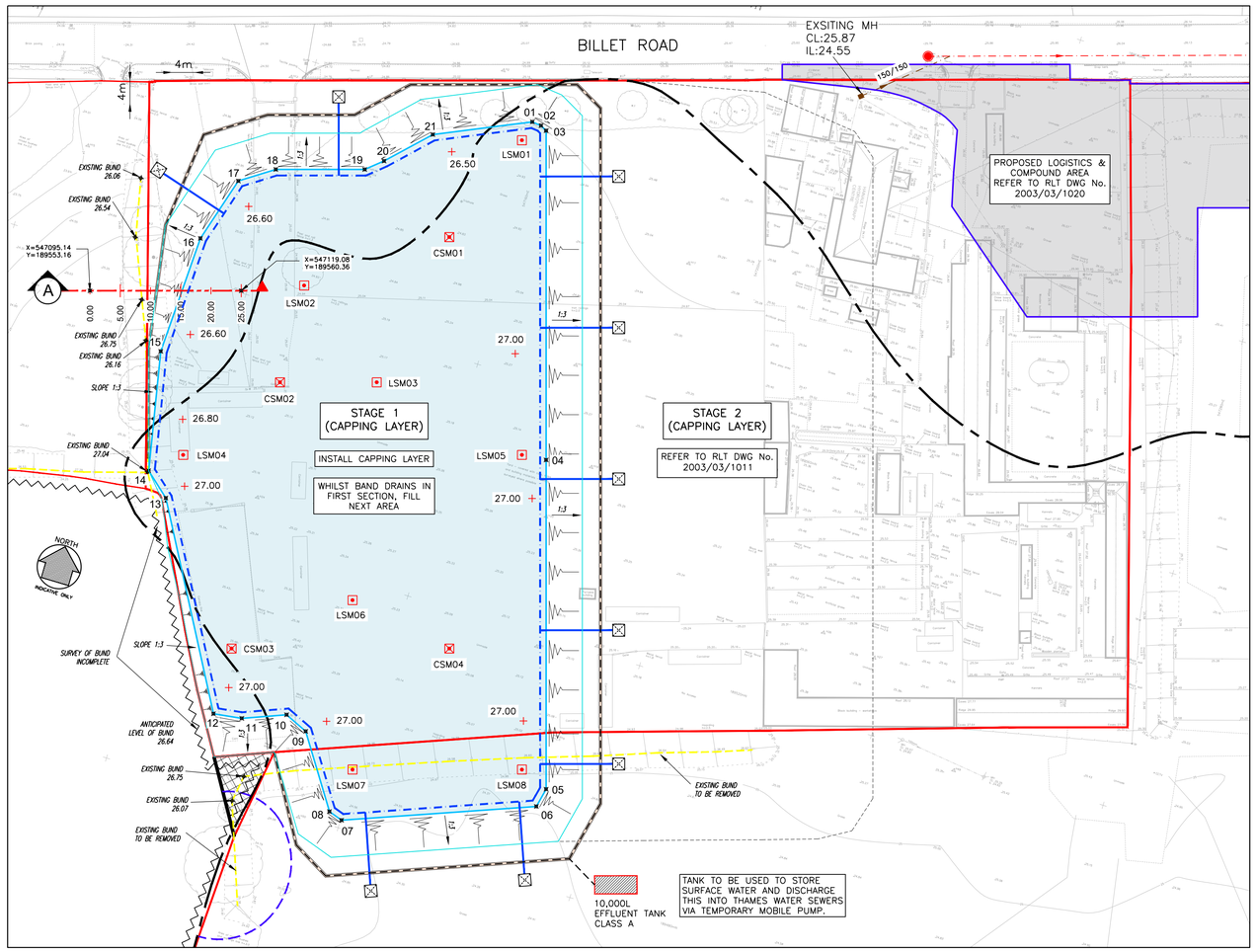
8.4 As with any sampling exercise, it is possible that groundworks will discover conditions or soils different from those found to date. Construction managers and supervisors should be aware that further remediation measures may be required if such conditions are found.

8.5 Any observations of ground conditions potentially atypical of those described above shall be reported to IDOM for assessment. Where, upon initial inspection, it is confirmed that potential new contamination has been encountered then the works will cease and IDOM will prepare and submit a Method Statement for assessing and dealing with the suspected contamination. This may include additional risk assessment and/or removal of contaminated material if this is deemed necessary. Additional contamination encountered shall be reported to the Local Authority and ensuing mitigation measures agreed in writing.

8.6 All works must be of a standard to discharge the relevant Planning Conditions.

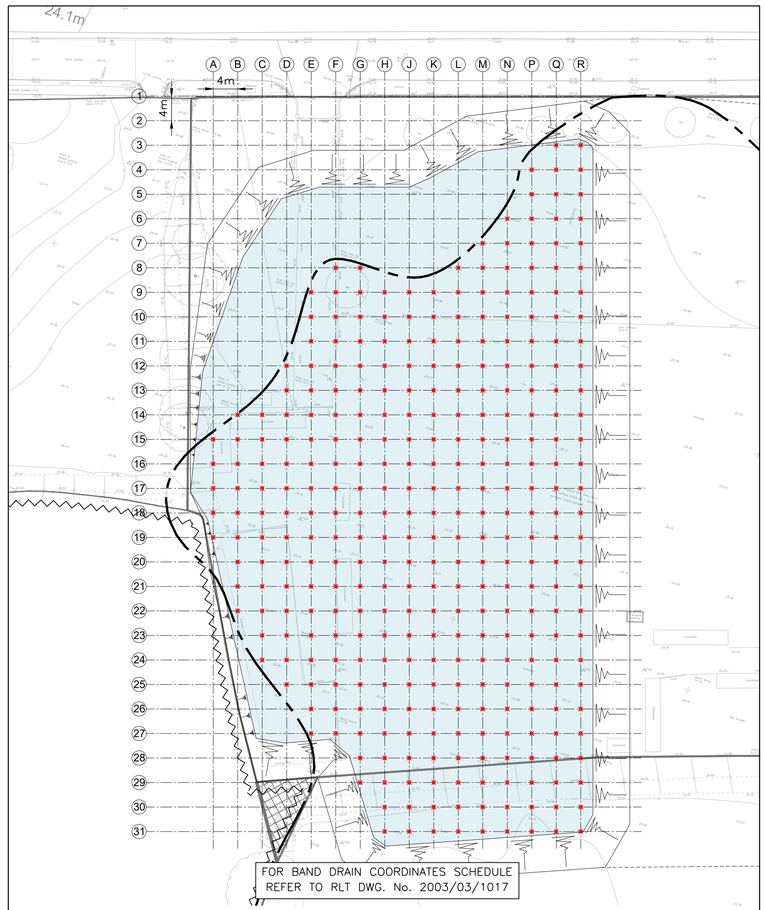
8.7 Any observations of ground conditions atypical of those already described should be reported to IDOM immediately so that an assessment of appropriate action can be made.

APPENDIX 1 ▪ Drawings



STAGE 1 CAPPING LAYER GENERAL ARRANGEMENT

SCALE 1:500



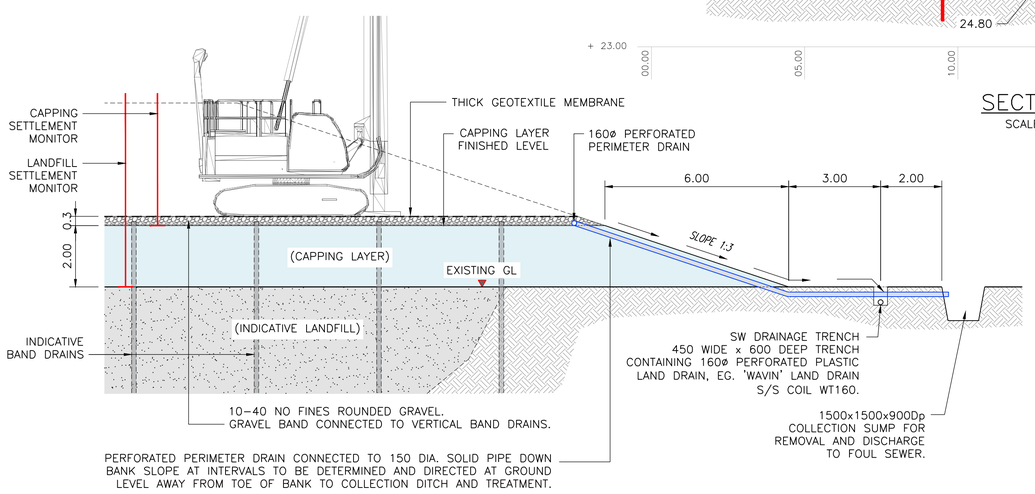
STAGE 1 BAND DRAIN GENERAL ARRANGEMENT

SCALE 1:500

STAGE 1 CAPPING LAYER COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
1	XXXXXX.XXX	XXXXXX.XXX
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		

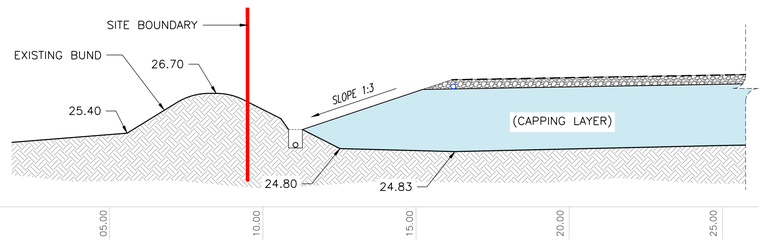
STAGE 1 LANDFILL SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
LSM01	XXXXXX.XXX	XXXXXX.XXX
LSM02		
LSM03		
LSM04		
LSM05		
LSM06		
LSM07		
LSM08		

STAGE 1 CAPPING SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
CSM01	XXXXXX.XXX	XXXXXX.XXX
CSM02		
CSM03		
CSM04		



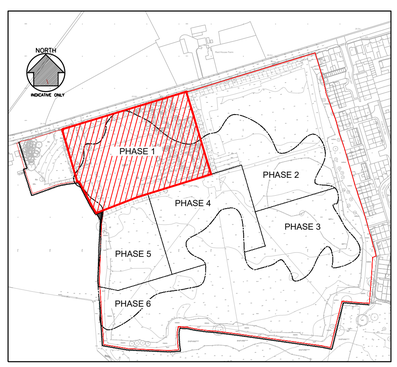
TYPICAL SECTION THROUGH SURCHARGE BANK

SCALE 1:100



SECTION A

SCALE 1:100



KEY PLAN

NTS

GENERAL NOTES

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KEY:

- LANDFILL BOUNDARY
- SITE BOUNDARY
- TOP LINE OF CAPPING LAYER EMBANKMENT
- BOTTOM LINE OF CAPPING LAYER EMBANKMENT
- 21 — CAPPING LAYER COORDINATE REFERENCE
- SITE BANKING
- 27.00 + — CAPPING LAYER FINISHED LEVEL
- EXISTING BUND
- ROOT PROTECTION LINE
- 160ø PERFORATED PERIMETER DRAIN
- 150ø SOLID PIPE DOWN BANK SLOPE
- 450 WIDE x 600 DEEP TRENCH CONTAINING 160ø PERFORATED PLASTIC LAND DRAIN
- COLLECTION SUMP FOR REMOVAL AND DISCHARGE TO FOUL SEWER
- EXISTING THAMES WATER MANHOLE/SEWER (FOUL)
- EXISTING PRIVATE SEWER (FOUL)
- EXISTING PRIVATE MH
- LSM01 — LANDFILL SETTLEMENT MONITORING POINTS
- CSM01 — CAPPING SETTLEMENT MONITORING POINTS

DRAFT

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Rev	Date	Description	Drawn	Checked
G				
F				
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B				
A				
Revisions				
Date	XX.XX.22	FIRST ISSUE	RPA	NTU

Project

SITE A & B OF THE WIDER "LAND AT BILLET ROAD" OPPORTUNITY SITE

Title

PHASE / SEQUENCE OF CAPPING LAYER & SURCHARGE C/A SHEET 1 OF 5

WORK IN PROGRESS

Client

BELLWAY HOMES THAMES GATEWAY

RLT Engineering Consultants Ltd
Civil and Structural Consulting Engineers
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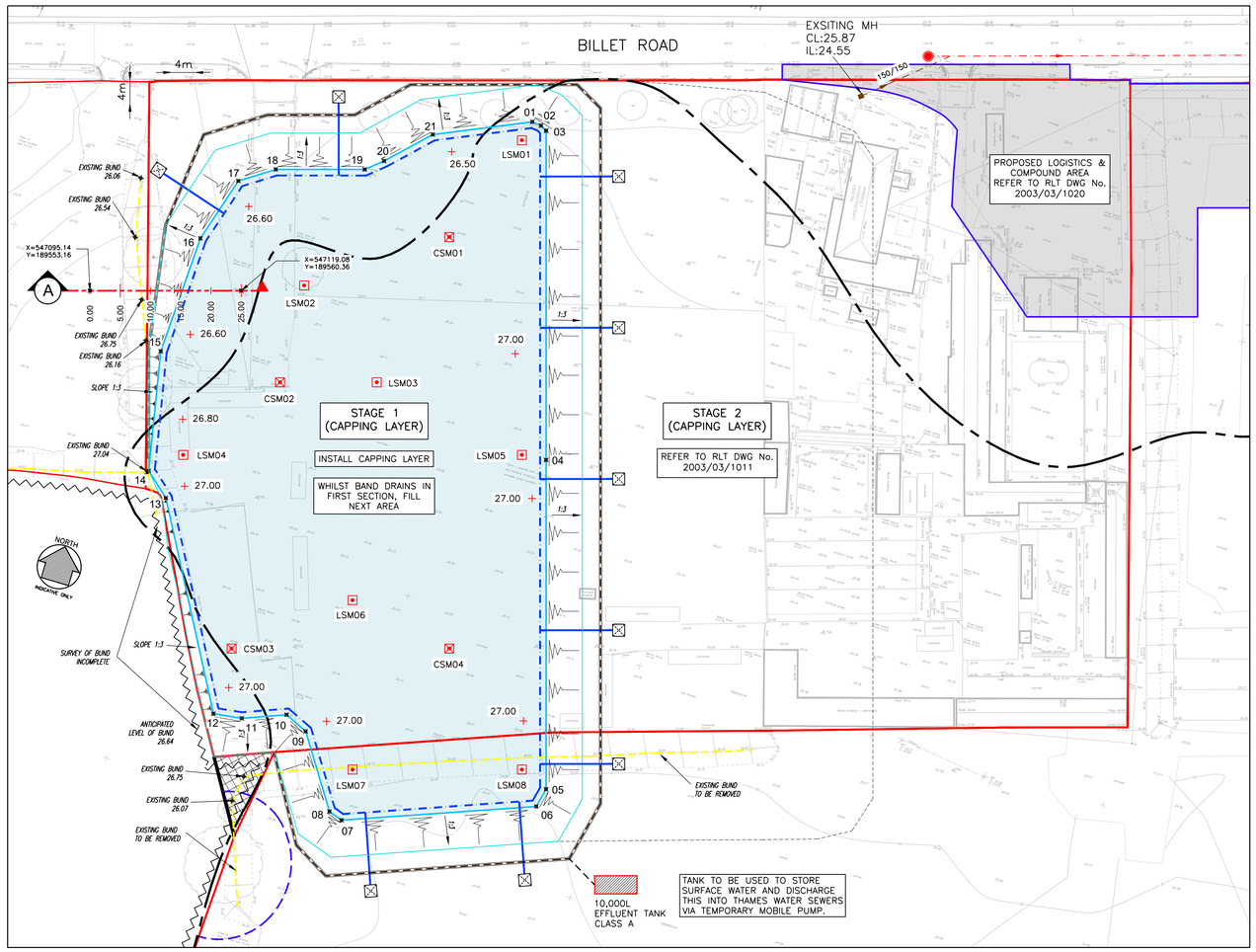
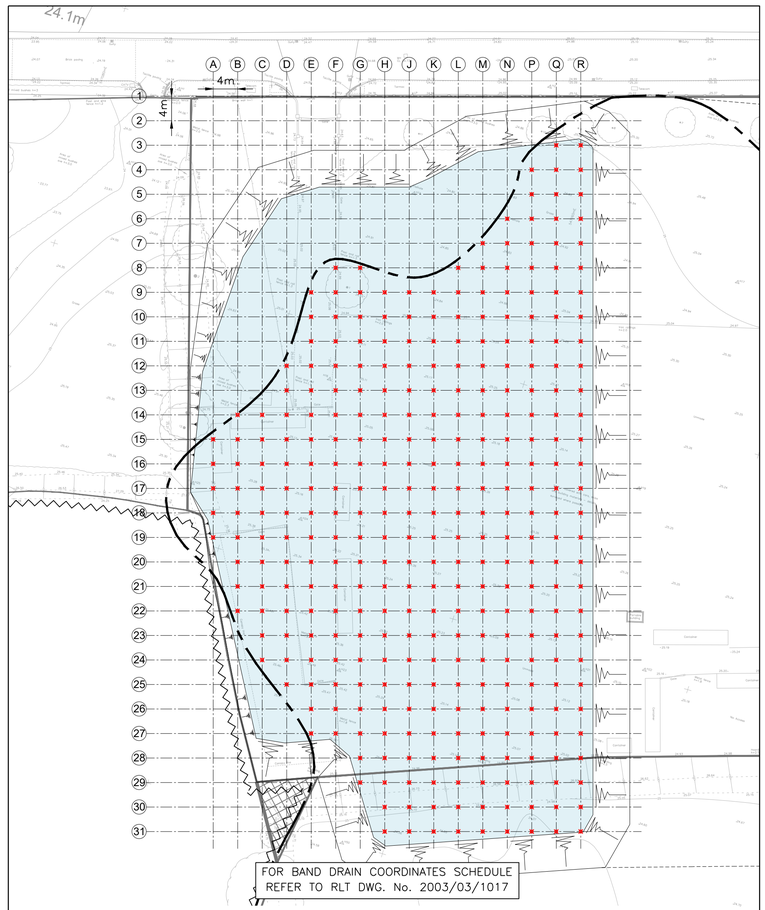
E: email@rltengcon.co.uk
QMS ISO 9001 REGISTERED

Dwg No. 2003/03/XXXX | Scales: 1:500 @ A1 | Rev: _



STAGE 1 CAPPING LAYER GENERAL ARRANGEMENT

SCALE 1:500



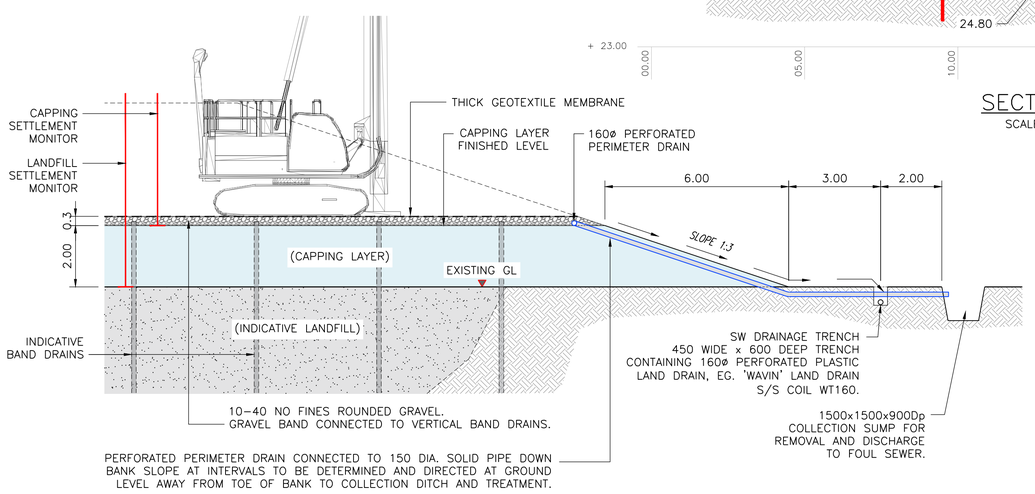
STAGE 1 BAND DRAIN GENERAL ARRANGEMENT

SCALE 1:500

STAGE 1 CAPPING LAYER COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
1	XXXXXX.XXX	XXXXXX.XXX
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		

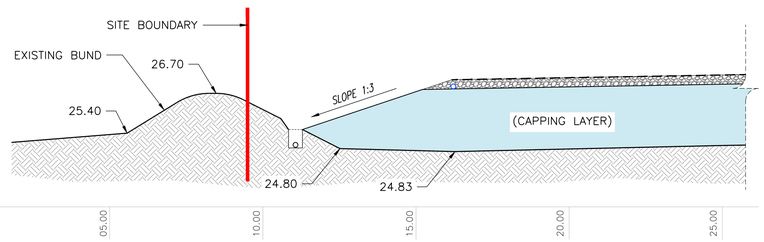
STAGE 1 LANDFILL SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
LSM01	XXXXXX.XXX	XXXXXX.XXX
LSM02		
LSM03		
LSM04		
LSM05		
LSM06		
LSM07		
LSM08		

STAGE 1 CAPPING SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
CSM01	XXXXXX.XXX	XXXXXX.XXX
CSM02		
CSM03		
CSM04		



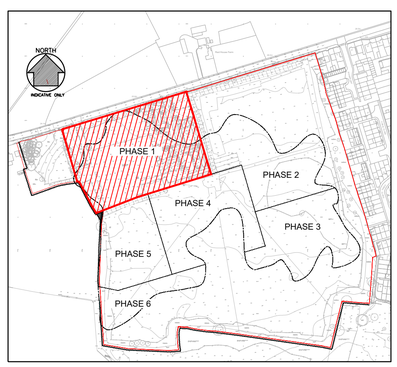
TYPICAL SECTION THROUGH SURCHARGE BANK

SCALE 1:100



SECTION A

SCALE 1:100



KEY PLAN

NTS

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Project

SITE A & B OF THE WIDER "LAND AT BILLET ROAD" OPPORTUNITY SITE

Title

PHASE / SEQUENCE OF CAPPING LAYER & SURCHARGE C/A SHEET 1 OF 5

WORK IN PROGRESS

Client

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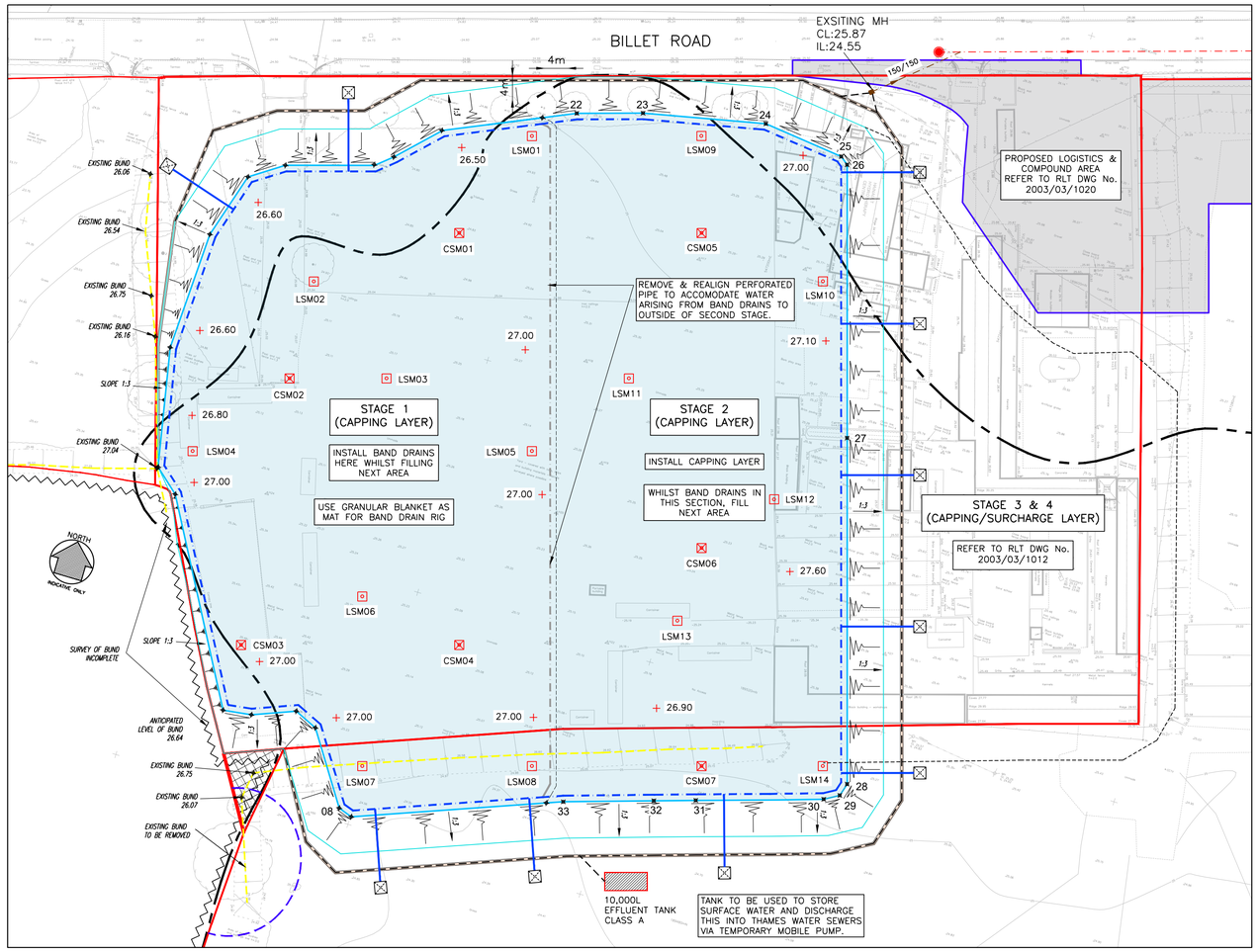
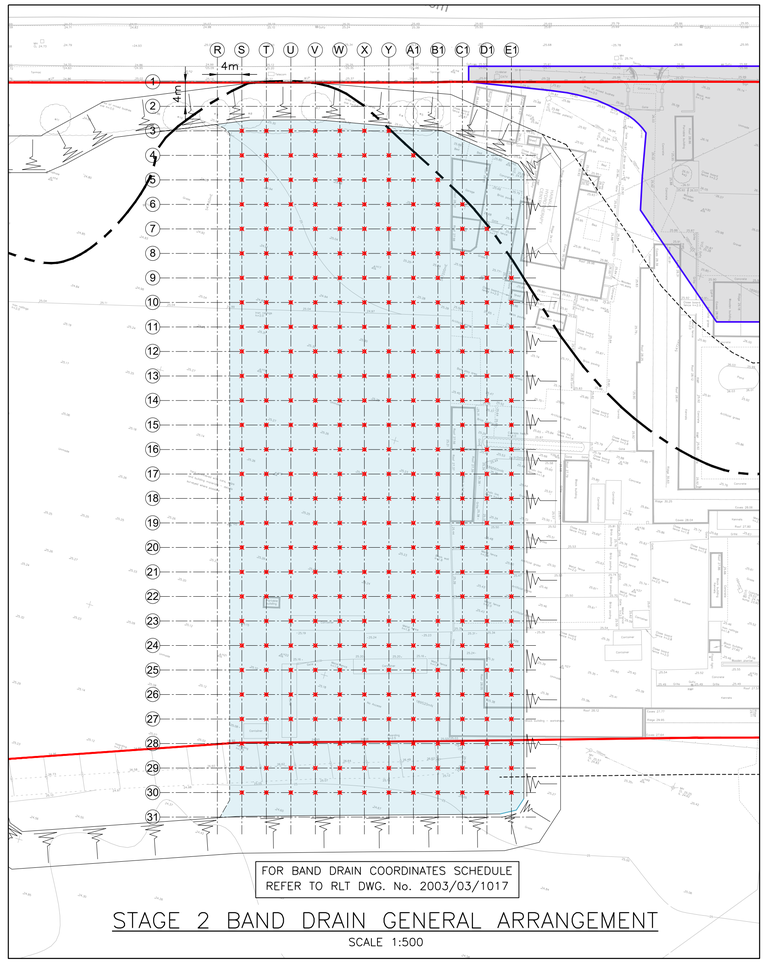
Dwg No. 2003/03/XXXX | Scales: 1:500 @ A1 | Rev: _



STAGE 2 CAPPING LAYER GENERAL ARRANGEMENT

SCALE 1:500



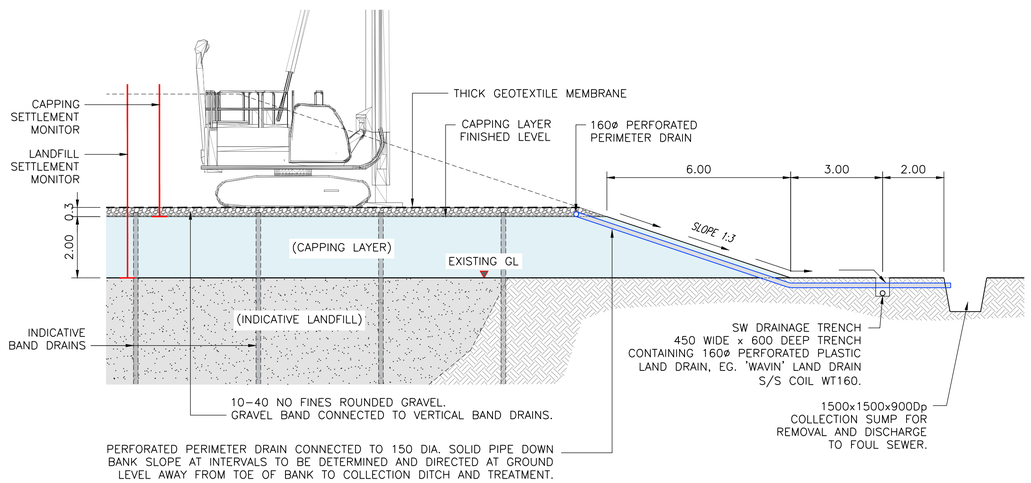
STAGE 2 BAND DRAIN GENERAL ARRANGEMENT

SCALE 1:500

STAGE 2 CAPPING LAYER COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
22	XXXXXX.XXX	XXXXXX.XXX
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		

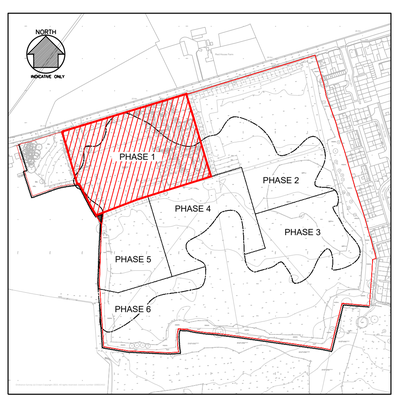
STAGE 2 LANDFILL SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
LSM09	XXXXXX.XXX	XXXXXX.XXX
LSM10		
LSM11		
LSM12		
LSM13		
LSM14		

STAGE 2 CAPPING SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
CSM05	XXXXXX.XXX	XXXXXX.XXX
CSM06		
CSM07		



TYPICAL SECTION THROUGH SURCHARGE BANK

SCALE 1:100



KEY PLAN

NTS

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- EXISTING PRIVATE SEWER (FOUL)
- EXISTING PRIVATE MH
- LSM01 — LANDFILL SETTLEMENT MONITORING POINTS
- CSM01 — CAPPING SETTLEMENT MONITORING POINTS

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Revisions

Project

SITE A & B OF THE WIDER "LAND AT BILLET ROAD" OPPORTUNITY SITE

Title

PHASE / SEQUENCE OF CAPPING LAYER & SURCHARGE SHEET 2 OF 5

WORK IN PROGRESS

Client

BELLWAY HOMES THAMES GATEWAY

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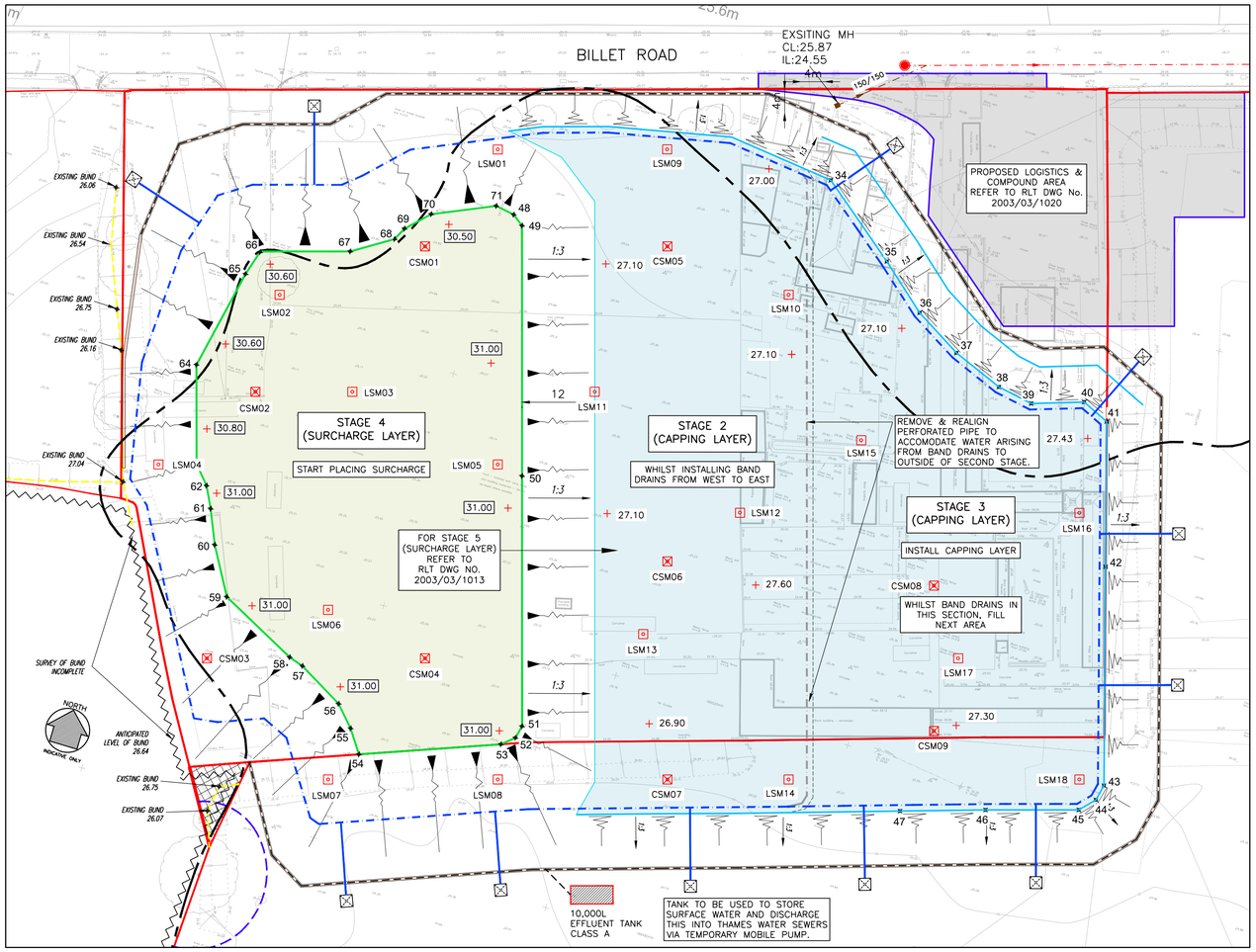
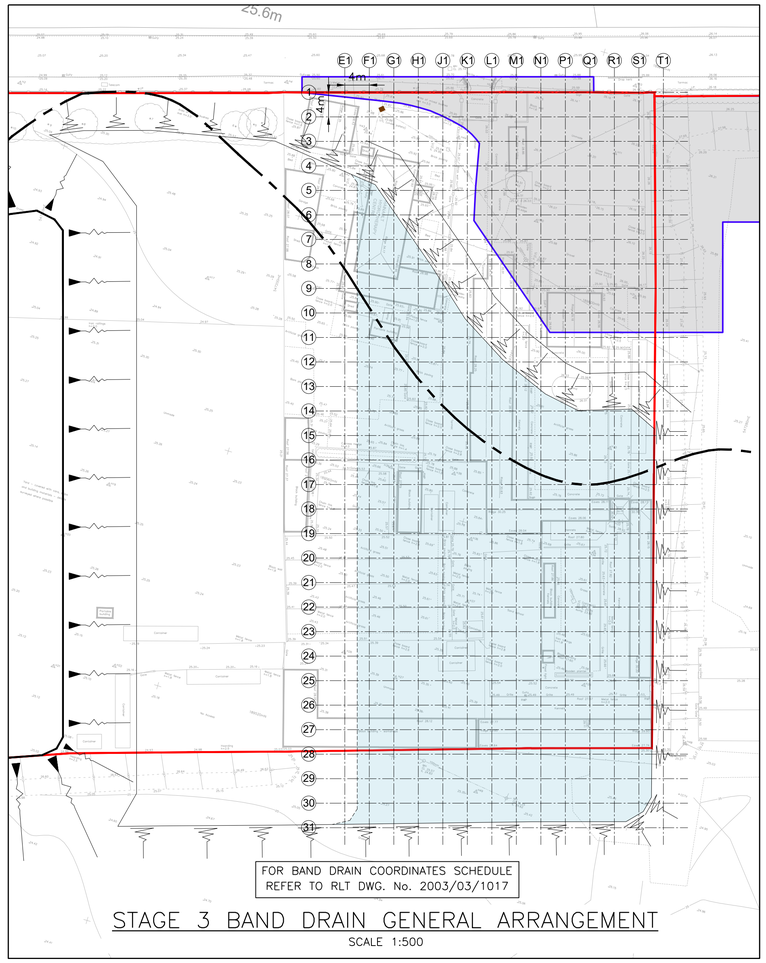
2 St Peter's Court Middleborough Colchester, Essex, CO1 1WD
T: 01206 768655
E: email@rltengcon.co.uk
QMS ISO 9001 REGISTERED

Dwg No. 2003/03/1011 | Scales: 1:500 @ A1 | Rev: _



STAGE 3 BAND DRAIN GENERAL ARRANGEMENT

SCALE 1:500



STAGE 3 CAPPING LAYER & STAGE 4 SURCHARGE LAYER GENERAL ARRANGEMENT

SCALE 1:500

STAGE 3 CAPPING LAYER COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
34	XXXXXX.XXX	XXXXXX.XXX
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		

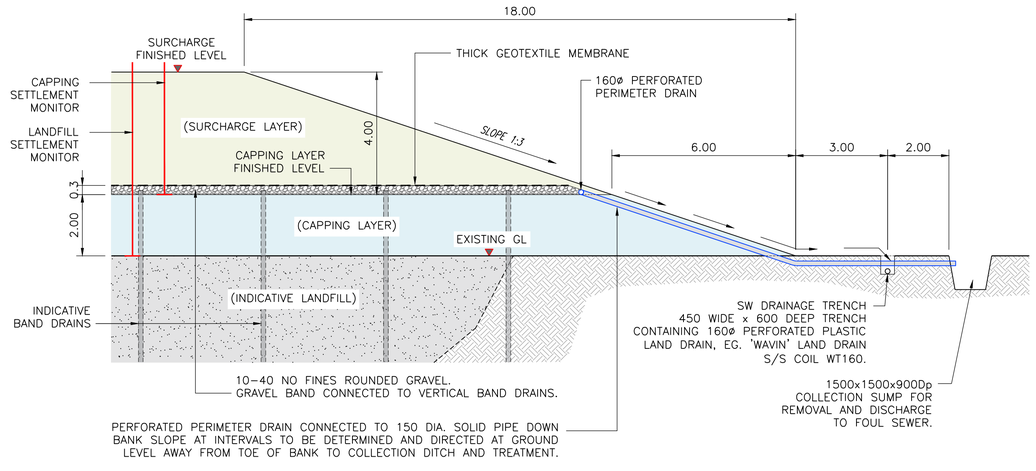
STAGE 3 LANDFILL SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
LSM14	XXXXXX.XXX	XXXXXX.XXX
LSM16		
LSM15		
LSM17		
LSM18		

STAGE 3 CAPPING SETTLEMENT MONITOR COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
CSM08	XXXXXX.XXX	XXXXXX.XXX
CSM09		

STAGE 4 SURCHARGE LAYER COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
48	XXXXXX.XXX	XXXXXX.XXX
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		

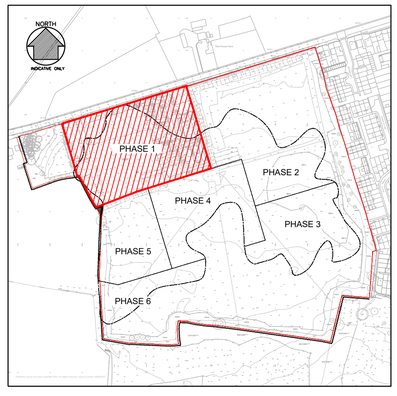
TYPICAL SECTION THROUGH SURCHARGE BANK

SCALE 1:100



KEY PLAN

NTS



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- SITE BOUNDARY
- TOP LINE OF SURCHARGE LAYER EMBANKMENT
- TOP LINE OF CAPPING LAYER EMBANKMENT
- BOTTOM LINE OF CAPPING LAYER EMBANKMENT
- 21 — CAPPING/SURCHARGE LAYER COORDINATE REFERENCE
- SITE BANKING
- 27.00 — CAPPING LAYER FINISHED LEVEL
- 27.00 — SURCHARGE LAYER FINISHED LEVEL
- EXISTING BUND
- ROOT PROTECTION LINE
- 160ø PERFORATED PERIMETER DRAIN
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- EXISTING PRIVATE MH
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- CSM01 — CAPPING SETTLEMENT MONITORING POINTS

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Date	XX.XX.22	FIRST ISSUE	RPA	NTU

Project

SITE A & B OF THE WIDER "LAND AT BILLET ROAD" OPPORTUNITY SITE

Title

PHASE / SEQUENCE OF CAPPING LAYER & SURCHARGE LAYER SHEET 3 OF 5

Client

BELLWAY HOMES THAMES GATEWAY

RLT Engineering Consultants Ltd
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2 St Peter's Court Middleborough Colchester, Essex, CO1 1WD
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QMS ISO 9001 REGISTERED

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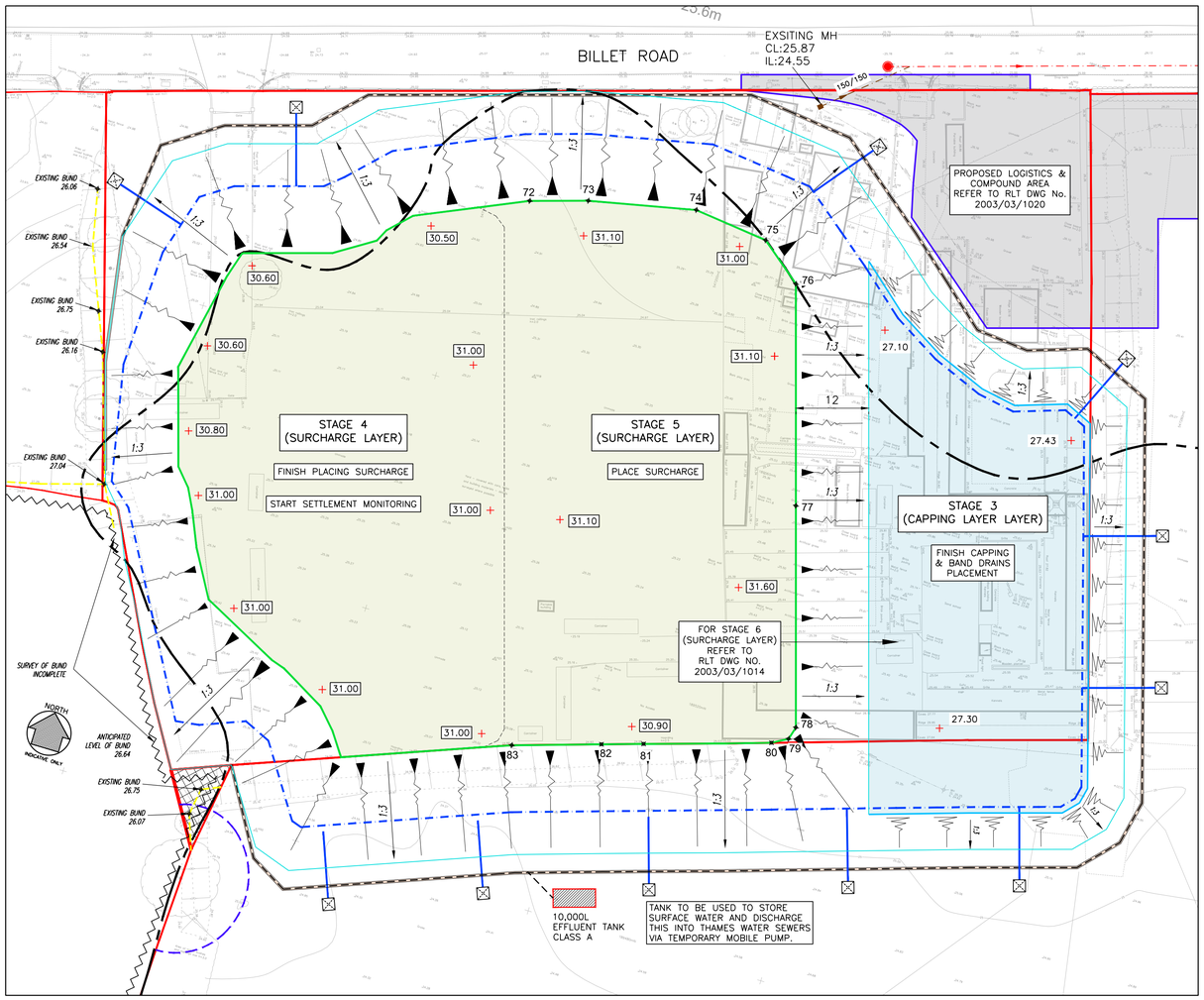
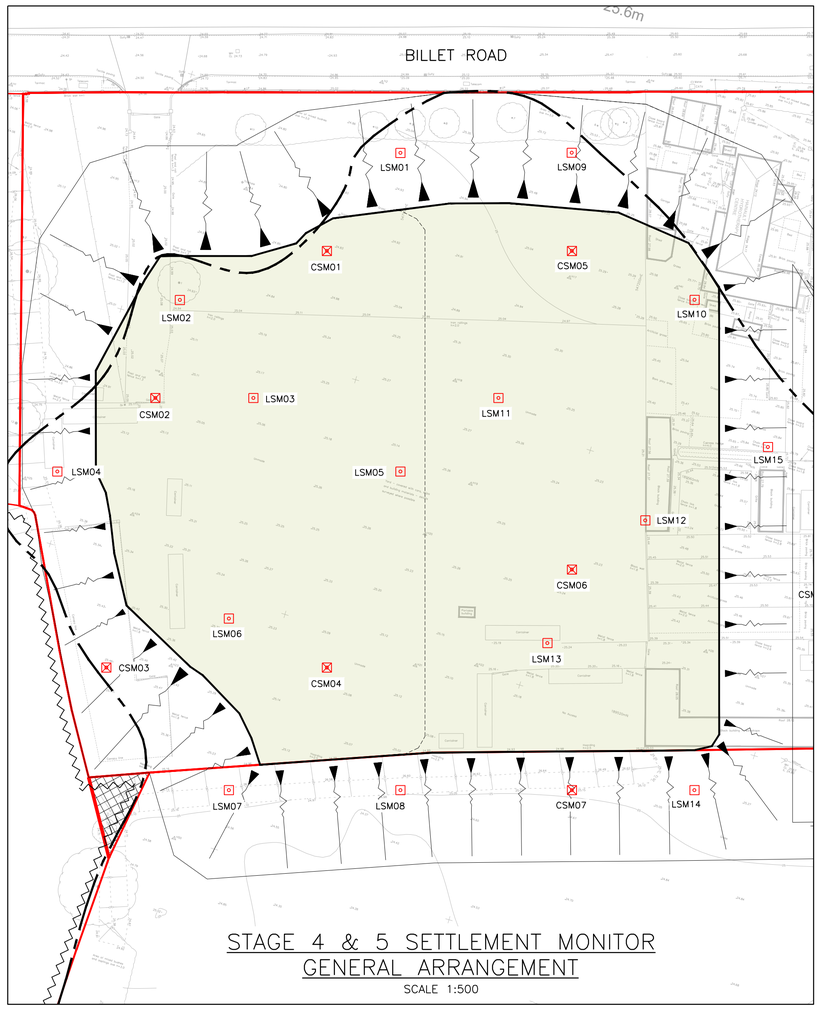
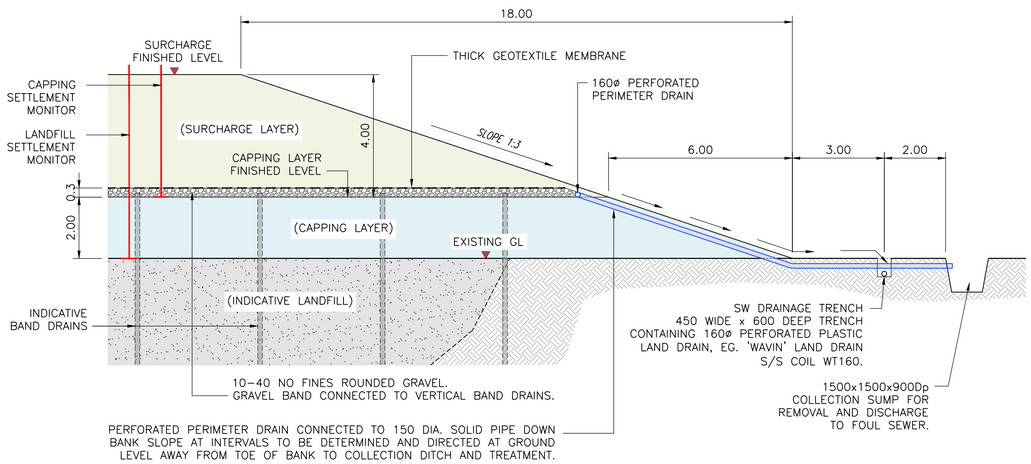


STAGE 5 SURCHARGE LAYER
GENERAL ARRANGEMENT
SCALE 1:500

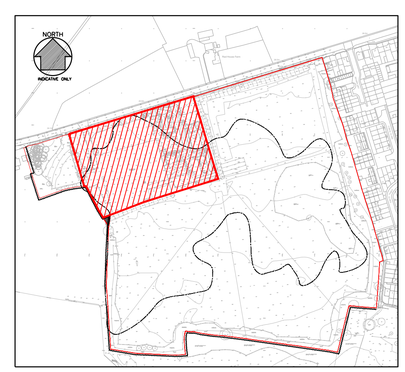


STAGE 4 & 5 SETTLEMENT MONITOR
GENERAL ARRANGEMENT
SCALE 1:500

STAGE 5 SURCHARGE LAYER COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
72	XXXXXX.XXX	XXXXXX.XXX
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		



TYPICAL SECTION THROUGH SURCHARGE BANK
SCALE 1:100



KEY PLAN
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DRAFT

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Revisions

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Project

SITE A & B OF THE WIDER "LAND AT BILLET ROAD" OPPORTUNITY SITE

Title

PHASE 1 SEQUENCE OF CAPPING LAYER & SURCHARGE
SHEET 4 OF 5

WORK IN PROGRESS

Client

BELLWAY HOMES
THAMES GATEWAY

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Civil and Structural Consulting Engineers
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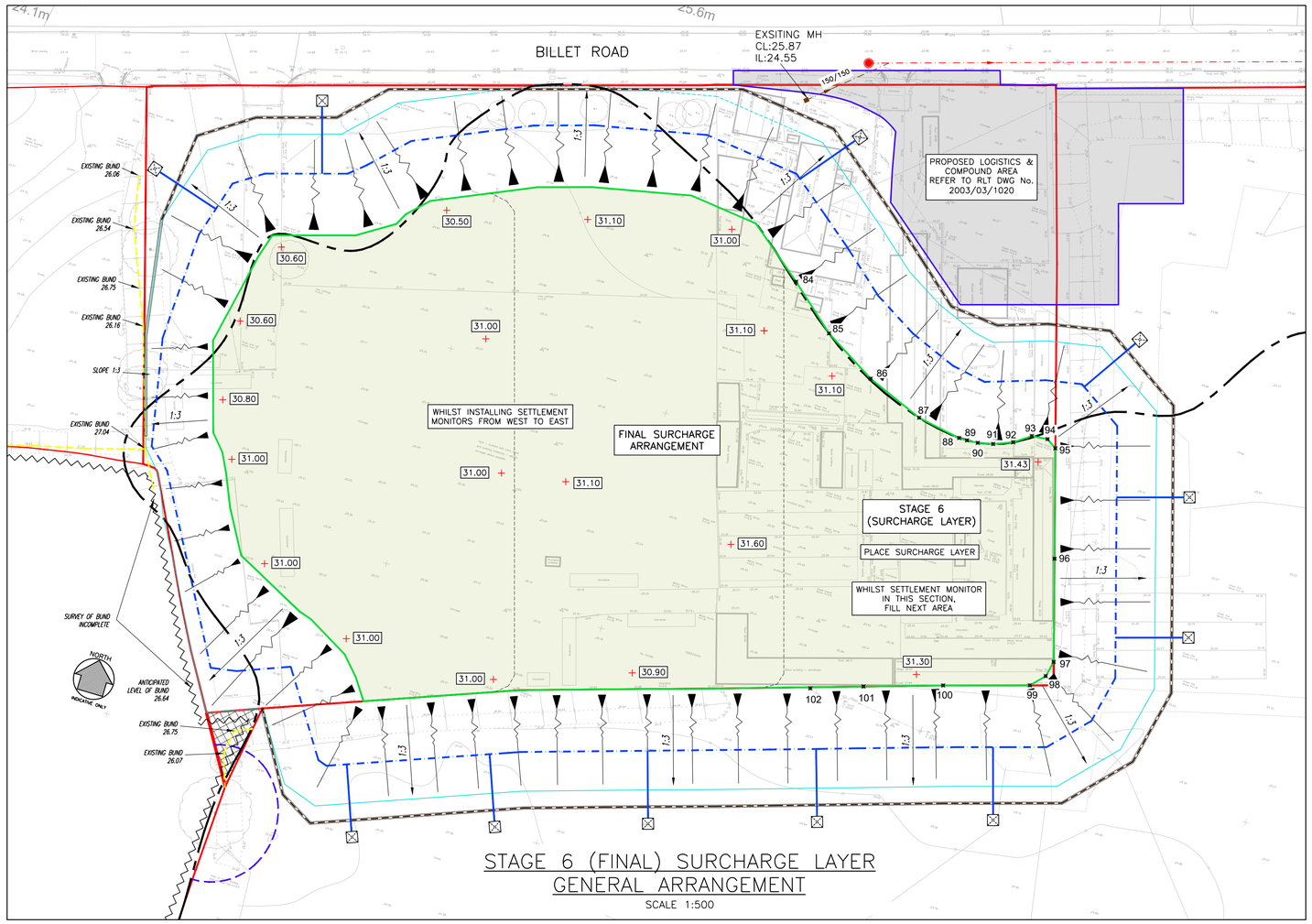
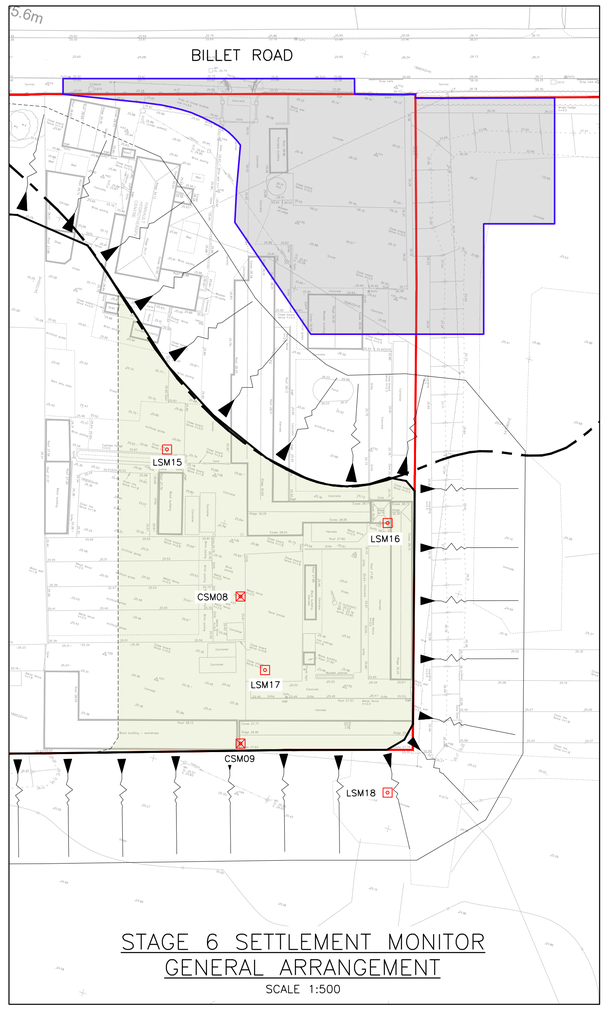
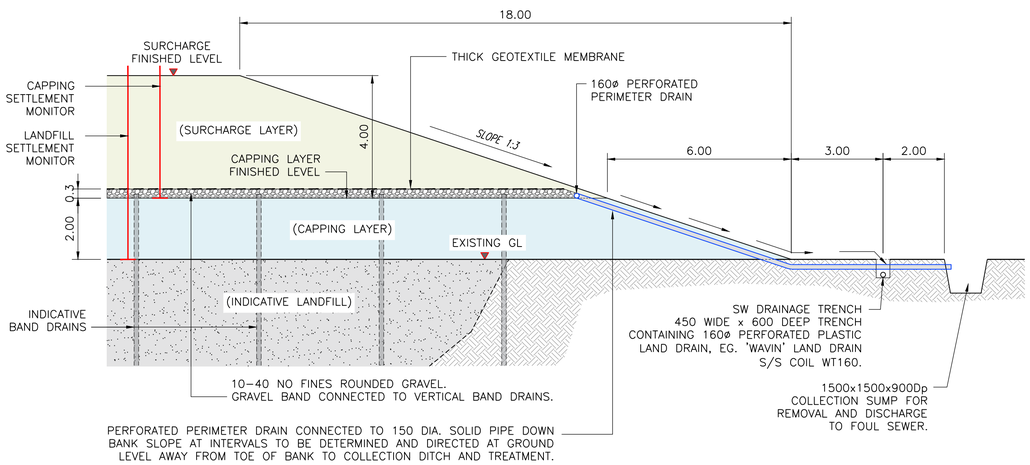


STAGE 6 (FINAL) SURCHARGE LAYER
GENERAL ARRANGEMENT
SCALE 1:500

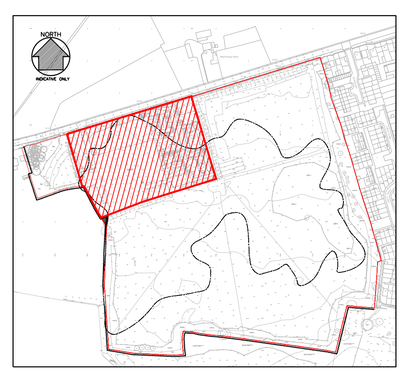


STAGE 6 SETTLEMENT MONITOR
GENERAL ARRANGEMENT
SCALE 1:500

STAGE 6 SURCHARGE LAYER COORDINATES		
POINT Ref.	EASTING (m)	NORTHING (m)
84	XXXXXX.XXX	XXXXXX.XXX
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		
101		
102		



TYPICAL SECTION THROUGH SURCHARGE BANK
SCALE 1:100



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KEY:

- LANDFILL BOUNDARY
- SITE BOUNDARY
- TOP LINE OF SURCHARGE LAYER EMBANKMENT
- TOP LINE OF CAPPING LAYER EMBANKMENT
- BOTTOM LINE OF CAPPING LAYER EMBANKMENT
- 21 — CAPPING/SURCHARGE LAYER COORDINATE REFERENCE
- SITE BANKING
- 27.00 — CAPPING LAYER FINISHED LEVEL
- 27.00 — SURCHARGE LAYER FINISHED LEVEL
- EXISTING BUND
- ROOT PROTECTION LINE
- 160ø PERFORATED PERIMETER DRAIN
- 150ø SOLID PIPE DOWN BANK SLOPE
- 450 WIDE x 600 DEEP TRENCH CONTAINING 160ø PERFORATED PLASTIC LAND DRAIN
- COLLECTION SUMP FOR REMOVAL AND DISCHARGE TO FOUL SEWER
- EXISTING THAMES WATER MANHOLE/SEWER (FOUL)
- EXISTING PRIVATE SEWER (FOUL)
- EXISTING PRIVATE MH
- LSM01 — LANDFILL SETTLEMENT MONITORING POINTS
- CSM01 — CAPPING SETTLEMENT MONITORING POINTS

DRAFT

A — LATEST REVISIONS ARE 'TAGGED' WITH THIS INDICATOR. HOWEVER, ALL USERS OF THIS DRAWING MUST SATISFY THEMSELVES OF ALL REVISIONS TO ANY PREVIOUS ISSUES. BY COMPARISON OF THIS DRAWING AGAINST OTHER ISSUES, AS IT CANNOT BE GUARANTEED THAT EVERY ITEM OF REVISION HAS BEEN 'TAGGED'.

Rev	Date	Description	Drwn	Chkd
G				
F				
E				
D				
C				
B				
A				

Revisions

Date				
XX.XX.22	FIRST ISSUE		RPA	NTU

Project
SITE A & B OF THE WIDER "LAND AT BILLET ROAD" OPPORTUNITY SITE

Title
PHASE 1 SEQUENCE OF CAPPING LAYER & SURCHARGE
SHEET 5 OF 5

WORK IN PROGRESS

Client
BELLWAY HOMES
THAMES GATEWAY

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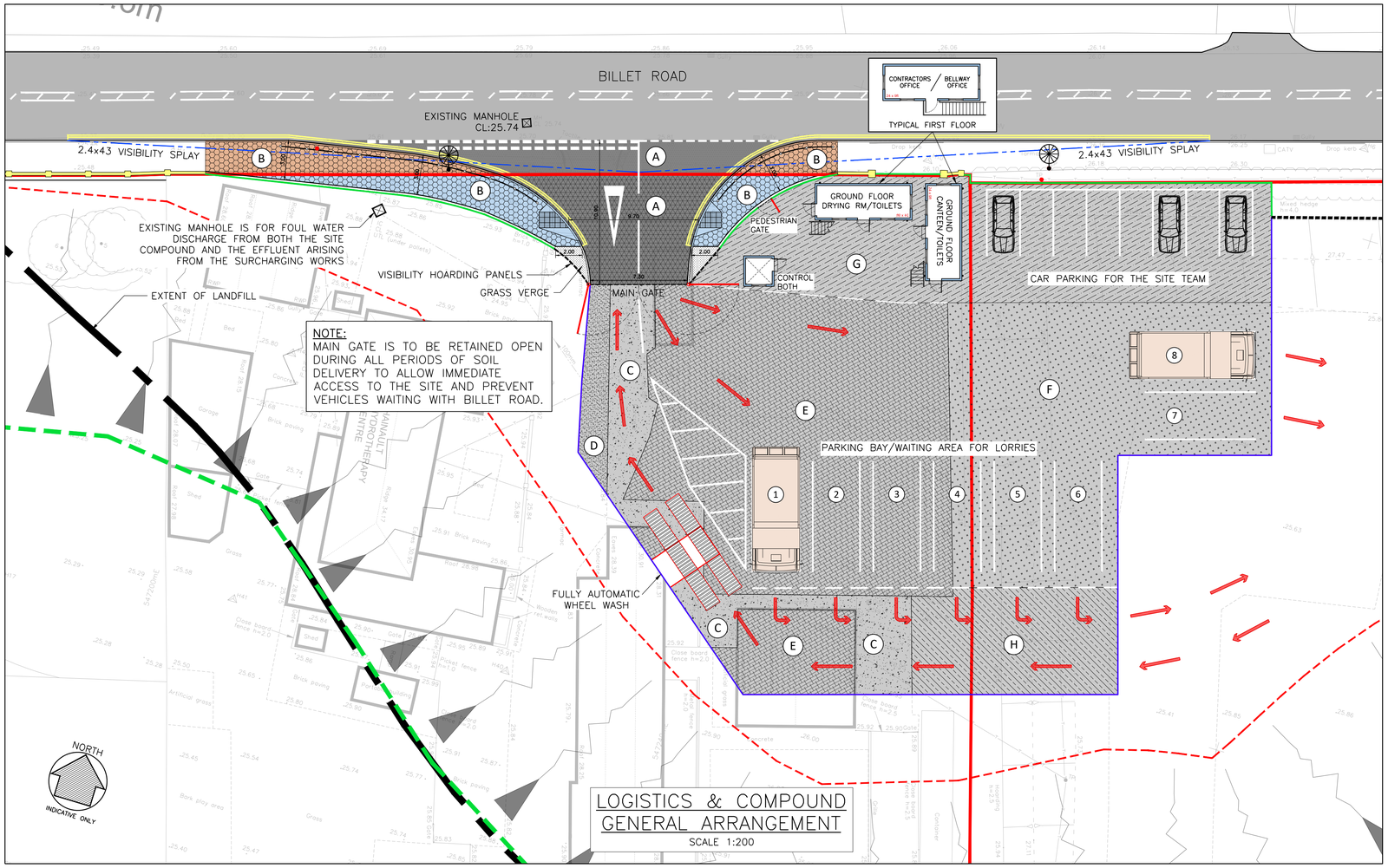
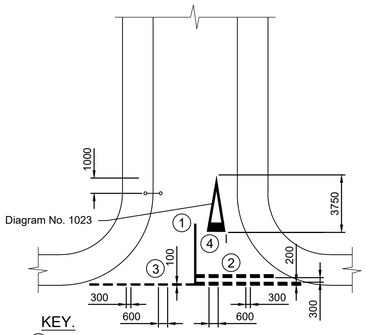
QMS ISO 9001 REGISTERED

Dwg No. 2003/03/1014 | Scales: 1:500 @ A1 | Rev: _



LOGISTICS & COMPOUND GENERAL ARRANGEMENT
SCALE 1:200



KEY.

1. White 4m mark, 2m gap, TTSRAGD 2002 diagram No. 1004.
2. White 600mm mark, 300mm gap, 200mm wide **TTSRAGD 2002**, Diagram No. 1003.
3. White 600mm mark, 300mm gap, 100mm wide **TTSRAGD 2002**, Diagram No. 1009.

TTSRAGD – The Traffic Signs Regulations and General Directions 2002 (T.S.O.).

NOTES.

- All markings to be thermoplastic screed with applied solid glass beads and designed in accordance with Traffic Signs Manual – Chapter 5 Road Markings 2003 (T.S.O.). and approved by the Local Authority
- Traffic signs must be in accordance with Traffic Signs Manual – Chapter 3 Regulatory Signs 1986 (T.S.O.) and approved by the Local Authority.
- Each "GIVE WAY" marking should normally incorporate a minimum of three 4m longitudinal warning lines separated by 2m gaps (1).

GIVE WAY ROAD MARKINGS FOR JUNCTIONS.
SCALE NTS

WHITE LINING & SIGN SCHEDULE

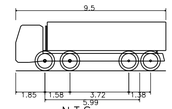
1. White 4000mm mark, 2000mm gap, 100mm wide. TSRD Diag No. 1004
2. White 600mm mark, 300mm gap, 200mm wide. TSRD Diag No. 1003
3. White 600mm mark, 300mm gap, 100mm wide. TSRD Diag No. 1009
4. Give Way Marking. 3750mm long. TSRD Diag No. 1023
5. Longitudinal line. TSRD Diag No. 1008

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ARCHITECTS, SPECIALISTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT/ENGINEER IMMEDIATELY.

KEY:

- SITE BOUNDARY
- PROPOSED HOARDING
- EXISTING HOARDING
- EXISTING BRICK FENCE
- BOTTOM LEVEL OF SURCHARGE
- FINISHED LEVEL OF SURCHARGE
- SITE BANKING
- EXISTING LIGHTING POST
- EXISTING TELEGRAPH POST
- PROPOSED PEDESTRIAN GUARDRAILS
- PROPOSED FOOTWAY NEW CONSTRUCTION
- PROPOSED TACTILE PAVED PEDESTRIAN CROSSING
- (A) PROPOSED ADOPTABLE CARRIAGEWAY
- (A) PROPOSED PRIVATE CARRIAGEWAY
- (B) PROPOSED ADOPTABLE FOOTWAY
- (B) PROPOSED PRIVATE FOOTWAY



N.T.S.

Copy Of Standard 8 Wheeler Tipper Lorry

Overall Length	9.500m
Overall Width	3.550m
Overall Body Height	3.079m
Min Body Ground Clearance	0.530m
Track Width	3.550m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	11.550m

FOR APPROVAL

(A) LATEST REVISIONS ARE 'TAGGED' WITH THIS INDICATOR. HOWEVER, ALL USERS OF THIS DRAWING MUST SATISFY THEMSELVES OF ALL REVISIONS TO ANY PREVIOUS ISSUES, BY COMPARISON OF THIS DRAWING AGAINST OTHER ISSUES, AS IT CANNOT BE GUARANTEED THAT EVERY ITEM OF REVISION HAS BEEN 'TAGGED'.

Rev	Date	Description	Drawn & Checked	Checked
G				
F				
E				
D				
C	25.11.22	SURFACE FINISHES & KEY UPDATED. DOUBLE YELLOW LINES & NOTE ADDED.	RPA	NTU
B	18.11.22	GENERAL UPDATE. DRAWING NO. UPDATED.	RPA	NTU
A	17.11.22	WELFARE & SITE CAR PARK AREA UPDATED	RPA	NTU
Revisions				
Date	15.11.22	FIRST ISSUE	RPA	NTU

Project

SITE A & B OF THE WIDER "LAND AT BILLET ROAD" OPPORTUNITY SITE

Title

LOGISTICS AND COMPOUND GENERAL ARRANGEMENT

Client

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Dwg No. 2003/03/1020 | Scales: 1:200 @ A1 | Rev: C

(A) CARRIAGEWAY TYPE 1–ASPHALT BASE
40MM WEARING COURSE (SMA/HRA/AC) 10MM AGGREGATES
60MM BINDER COURSE (SMA/AC/HRA) 14 OR 20MM AGGREGATES
170MM ROAD BASE (SMA/HRA/AC) 32MM AGGREGATES
225MM MINIMUM TYPE 1 SUB–BASE (SUBGRADE CBR 15%)

(B) BLACKTOP FOOTWAY (TACTILE PAVING AREA)
30MM AC6 DENSE SURF 100/150 SURFACE COURSE
100MM CONCRETE OR 100MM AC14 OR AC20 DENSE BASE 100/150 BINDER COURSE
150MM TYPE 1 SUB–BASE TO CLAUSE 803

(C) EXISTING CONCRETE SURFACE – TO BE RETAINED

(D) EXISTING TARMAC SURFACE – TO BE RETAINED

(E) EXCAVATE AND REMOVE EXISTING MATERIAL TO A DEPTH OF 240MM
COMPACT THE SUBGRADE WITH 5 PASSES OF BOMAG 120 AD OR SIMILAR.

NEW CONSTRUCTION:
90MM BINDER – DENSE BITUMINOUS MACADAM TO BS EN 4987 100/150 PEN
150MM SUB –BASE TYPE 1 GRANULAR MATERIAL TO CLAUSE 803 OF THE SPECIFICATION FOR HIGHWAY WORKS.

(F) EXCAVATE TO A LEVEL OF APPROXIMATELY 25.80 AOD AND REMOVE EXISTING SOIL.
COMPACT THE SUBGRADE WITH 5 PASSES OF BOMAG 120 AD OR SIMILAR.

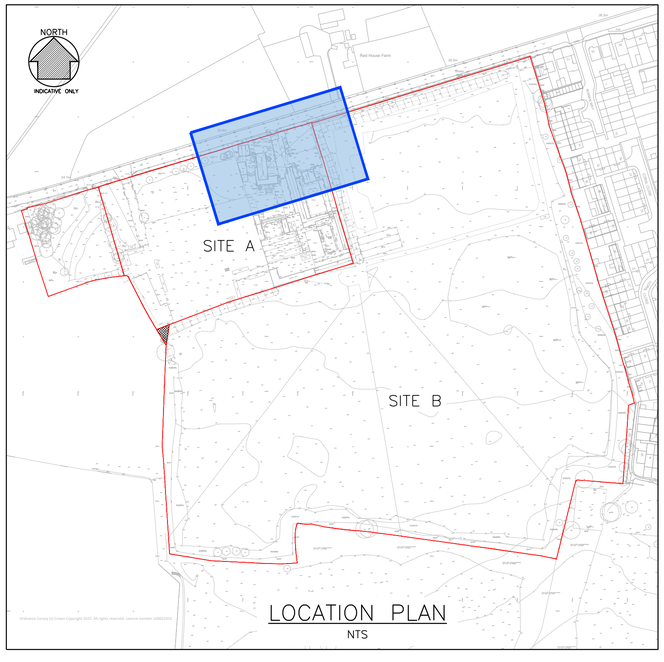
NEW CONSTRUCTION:
90MM BINDER – DENSE BITUMINOUS MACADAM TO BS EN 4987 100/150 PEN
150MM SUB –BASE TYPE 1 GRANULAR MATERIAL TO CLAUSE 803 OF THE SPECIFICATION FOR HIGHWAY WORKS.
CAPPING LAYER – 150MM OF TYPE 6F5 MATERIAL TO CLAUSE 613 OF THE SPECIFICATION FOR HIGHWAY WORKS.

(G) EXCAVATE AND REMOVE EXISTING MATERIAL TO A DEPTH OF 240MM
COMPACT THE SUBGRADE WITH 5 PASSES OF BOMAG 120 AD OR SIMILAR.

NEW CONSTRUCTION:
75MM ROAD PLANINGS
150MM SUB –BASE TYPE 1 ON LOTRAK FORMATION.

(H) EXCAVATE TO A LEVEL OF APPROXIMATELY 25.80 AOD AND REMOVE EXISTING SOIL.
COMPACT THE SUBGRADE WITH 5 PASSES OF BOMAG 120 AD OR SIMILAR.

NEW CONSTRUCTION:
75MM ROAD PLANINGS
150MM SUB –BASE TYPE 1 ON LOTRAK FORMATION.
CAPPING LAYER – 150MM OF TYPE 6F5 MATERIAL TO CLAUSE 613 OF THE SPECIFICATION FOR HIGHWAY WORKS.



LOCATION PLAN
NTS

APPENDIX 2 SHW Series 600 Tables for Method Compaction for Earthworks Material : Plant & Methods

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
GENERAL GRANULAR FILL	1	A	-	Well graded granular material	General Fill	Any material, or combination of materials, other than material designated as Class 3 in the Contract. (Properties (i), (ii) and (iv) in next column, shall not apply to chalk). Recycled aggregate	(i) grading	BS 1377 : part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	1	A	-
							(ii) uniformity coefficient	See Note 5	10	-				
							(iii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iv) MCV	Clause 632	App 6/1	App 6/1				
							(v) IDD of chalk	Clause 634	-	App 6/1				
	1	B	-	Uniformly graded granular material	General Fill	Any material, or combination of materials, other than chalk. Recycled aggregate	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 3	1	B	-
							(ii) uniformity coefficient	See Note 5	-	10				
							(iii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iv) MCV	Clause 632	App 6/1	App 6/1				
	1	C	-	Coarse granular material	General Fill	Any material, or combination of materials, other than material designated as Class 3 in the Contract. (Properties (i) and (ii) in next column, shall not apply to chalk). Recycled aggregate	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 5	1	C	-
							(ii) uniformity coefficient	See Note 5	5	-				
							(iii) Los Angeles coefficient	Clause 635	-	50				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
GENERAL COHESIVE FILL	2	A	-	Wet cohesive material	General Fill	Any material, or combination of materials, other than chalk.	(i) grading	BS 1377 : part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 1 except for materials with liquid limit greater than 50, determined by BS1377 : Part 2, only deadweight tamping or vibratory tamping rollers or grid rollers shall be used.	2	A	-
							(ii) plastic limit (PL)	BS 1377 : part 2	-	-				
							(iii) mc	BS 1377 : Part 2	PL -4%	App 6/1				
							(iv) MCV	Clause 632	App 6/1	App 6/1				
							(v) Undrained shear strength of remoulded material	Clause 633	App 6/1	App 6/1				
	2	B	-	Dry cohesive material	General Fill	Any material, or combination of materials, other than chalk	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	2	B	-
							(ii) plastic limit (PL)	BS 1377 : Part 2	-	-				
							(iii) mc	BS 1377 : Part 2	App 6/1	PL -4%				
							(iv) MCV	Clause 632	App 6/1	App 6/1				
							(v) undrained shear strength of remoulded material	Clause 633	App 6/1	App 6/1				

TABLE 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
GENERAL COHESIVE FILL	2	C	-	Stony cohesive material	General Fill	Any material, or combination of materials, other than chalk	(i) grading	BS 1377 : part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	2	C	-
							(ii) plastic limit (PL)	BS 1377 : part 2	-	-				
							(iii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iv) MCV	Clause 632	App 6/1	-				
							(v) Undrained shear strength of remoulded material	Clause 633	App 6/1	-				
	2	D	-	Silty cohesive material	General Fill	Any material, or combination of materials, other than chalk	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 3	2	D	-
							(ii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iii) MCV	Clause 632	App 6/1	App 6/1				
							(iv) undrained shear strength of remoulded material	Clause 633	App 6/1	App 6/1				
	2	E	-	Reclaimed pulverised fuel ash cohesive material	General Fill	Reclaimed material from lagoon or stockpile containing not more than 20% furnace bottom ash	(i) mc	BS 1377 : Part 2	To enable compaction to Clause 612		End product 95% of maximum dry density of BS 1377 : Part 4 (2.5 kg rammer method)	2	E	-
							(ii) bulk density	BS 1377 : Part 9	App 6/1	App 6/1				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
GENERAL CHALK	FILL	3	-	-	Chalk	General Fill	Chalk and associated materials all designated as Class 3 in the Contract	(i) mc	BS 1377 : Part 2	-	App 6/1	Tab 6/4 Method 4, or Method 1 if required in App 6/1. All types of vibratory rollers of Categories over 1800 kg shall not be used	3	-	-
								(ii) IDD	Clause 634	App 6/1	App 6/1			
LANDSCAPE	FILL	4	-	-	Various	Fill to landscape areas	See App 6/1	(i) grading	BS 1377 : Part 2	App 6/1	App 6/1	See Clause 620 and App 6/1	4	-	-
								(ii) mc	BS 1377 : Part 2	-	App 6/1			
								(iii) MCV	Clause 632	App 6/1	App 6/1			
TOPSOIL		5	A	-	Topsoil, or turf, existing on site	Topsoiling	Topsoil or turf designated as Class 5A in the Contract	(i) grading	Clause 618	-	Clause 618	-	5	A	-
		5	B	-	Imported topsoil	Topsoiling	General purpose grade complying with BS 3882	-	-	-	-	-	5	B	-

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	A	-	Selected well graded granular material	Below water	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, chalk, well burnt colliery spoil or any combination thereof. (Properties (i) and (ii) in next column, shall not apply t chalk.) Recycled aggregate	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	No compaction	6	A	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) uniformity	See Note 5	10	-				
							(iii) SMC of chalk index	Clause 634	-	20%				
							(iv) plasticity index	BS 1377 : Part 2	Non-plastic					
	6	B	-	Selected coarse granular material	Starter layer	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, chalk, well burnt colliery spoil, slag or any combination thereof. (Properties (ii) and (iii) in next column, shall not apply to chalk.) Recycled aggregate	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 5	6	B	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) plasticity index	BS 1377 : Part 2	Non-plastic					
							(iii) Los Angeles coefficient	Clause 635	-	50				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	C	-	Selected uniformly graded granular material	Starter layer	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, chalk, well burnt colliery spoil, slag or any combination thereof. (Property (iii) in next column, shall not apply to chalk.) Recycled aggregate	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 3	6	C	-
								BS EN 933-2 (Off-site)	Table 6/5	Tab 6/5				
							(ii) uniformity coefficient	See Note 5	-	10				
							(iii) plasticity index	BS 1377 : Part 2	Non-plastic					
							(iv) Los Angeles coefficient	Clause 635	-	50				
							(v) mc	BS 1377 : Part 2	App 6/1	App 6/1				
	6	D	-	Selected uniformly graded granular material	Starter layer below pulverised fuel ash	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, chalk, well burnt colliery spoil, slag or any combination thereof. Recycled aggregate	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 4	6	D	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) uniformity coefficient	See Note 5	-	10				
							(iii) plasticity index	BS 1377 : Part 2	Non-plastic					
							(iv) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(v) MCV	Clause 632	App 6/1	App 6/1				

TABLE 6/1: (11/08) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	E	-	Selected granular material (Class 9A)	For stabilisation with cement to form capping	Any material, or combination of materials, other than unburnt colliery spoil and argillaceous rock. (Properties (i), (ii) and (iii) in next column, shall not apply to chalk.) Recycled aggregate	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Not applicable	6	E	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) mc	BS 1377 : Part 2	-	App 6/1				
							(iii) liquid limit	BS 1377 : Part 2	-	45				
							(iv) plasticity index	BS 1377 : Part 2	-	20				
							(v) organic matter	BS 1377 : Part 3	-	App 6/1				
							(vi) water soluble (WS) sulfate content	TRL Report 477, Test No. 1	-	3000 mg/l as SO_4				
							(vii) oxidisable sulfides (OS) content	TRL Report 477, Tests No. 2 and 4	-	0.6% as SO_4				
							(viii) SMC of chalk	Clause 634		20%				

TABLE 6/1: (11/09) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	F	1	Selected granular material (fine grading)	Capping	Any material, or combination of materials - including recycled aggregates with not more than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials that contain tar and tar-bitumen binders, unburnt colliery spoil, argillaceous rock and chalk. Property (vi) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less.	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 6	6	F	1
							(ii) optimum mc	BS 1377 : Part 4 (vibrating hammer method)	-	-				
							(iii) mc	BS 1377 : Part 2	Optimum mc - 2%	Optimum mc				
							(iv) Los Angeles coefficient	Clause 635	-	60				
							(v) Class Ra (asphalt) content	Clause 710	-	50%				
							(vi) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%				
	6	F	2	Selected granular material (coarse grading)	Capping	Any material, or combination of materials - including recycled aggregates with not more than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials that contain tar and tar-bitumen binders, unburnt colliery spoil and argillaceous rock. Property (i) in the next column shall not apply to chalk. Property (vi) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less.	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 6	6	F	2
							(ii) optimum mc	BS 1377 : Part 4 (vibrating hammer method)	-	-				
							(iii) mc	BS 1377 : Part 2	Optimum mc - 2%	Optimum mc				
							(iv) Los Angeles coefficient	Clause 635	-	50				
							(v) Class Ra (asphalt) content	Clause 710	-	50%				
							(vi) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%				

TABLE 6/1: (11/09) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	F	3	Selected granular material	Capping	Any material, or combination of materials with not less than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials that contain tar and tar-bitumen binders, unburnt colliery spoil and argillaceous rock	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 6 Maximum Compacted layer thickness shall be 200 mm	6	F	3
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) optimum mc	Clause 613	-	-				
							(iii) mc	Clause 613	Optimum mc - 2%	Optimum mc				
							(iv) Class Ra (asphalt) content	Clause 710	50%					
							(v) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	10%				
	6	F	4	Selected granular material (fine grading) - imported on to the Site	Capping	Unbound mixture complying with BS EN 13285. Any material, or combination of materials - including recycled aggregates with not more than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials that contain tar and tar-bitumen binders, unburnt colliery spoil, argillaceous rock and chalk. Property (x) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less.	(i) Size designation and overall grading category	BS EN 13285 - 0/31.5 and G_E	Tab 6/5	Tab 6/5	Tab 6/4 Method 6	6	F	4
							(ii) Maximum fines and oversize categories	BS EN 13285 - UF_{15} and OC_{75}	Tab 6/5	Tab 6/5				
							(iii) Los Angeles coefficient	BS EN 13242 - LA_{60}	-	60				
							(iv) Volume stability of blast furnace slag	BS EN 13242 - free from dicalcium silicate and iron disintegration	-	-				

TABLE 6/1: (11/09) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	F	4	(contd)			(v) Volume stability of steel (BOF) and EAF) slag	BS EN 13242 - V_5	-	-				
							(vi) Other aggregate requirements	BS EN 13242 - Category $_{NR}$ (no requirement)	-	-				
							(vii) Laboratory dry density and optimum water content	BS EN 13285, clause 5.3 - declared values	-	-				
							(viii) Water content	BS EN 1097-5	Optimum wc - -2%	Optimum wc				
							(ix) Clas Ra (asphalt) content	Clause 710	-	50%				
							(x) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%				

TABLE 6/1: (11/09) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	F	5	Selected granular material (coarse grading) - imported on to the Site	Capping	Unbound mixture complying with BS EN 13285. Any material, or combination of materials - including recycled aggregates with not more than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials that contain tar and tar-bitumen binders, unburnt colliery spoil, argillaceous rock and chalk. Property (x) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less.	(i) Size designation and overall grading category	BS EN 13285 - 0/80 and G_E	Tab 6/5	Tab 6/5	Tab 6/4 Method 6	6	F	5
							(ii) Maximum fines and oversize categories	BS EN 13285 - UF_{12} and OC_{75}	Tab 6/5	Tab 6/5				
							(iii) Los Angeles coefficient	BS EN 13242 - LA_{50}	-	50				
							(iv) Volume stability of blast furnace slag	BS EN 13242 - free from dicalcium silicate and iron disintegration	-	-				
							(v) Volume stability of steel (BOF) and EAF) slag	BS EN 13242 - V_5	-	-				
							(vi) Other aggregate requirements	BS EN 13242 - Category $_{NR}$ (no requirement)	-	-				
							(vii) Laboratory dry density and optimum water content	BS EN 13285, clause 5.3 - declared values	-	-				
							(viii) Water content	BS EN 1097-5	Optimum wc - -2%	Optimum wc				
							(ix) Clas Ra (asphalt) content	Clause 710	-	50%				
							(x) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	G	-	Selected granular material	Gabion filling	Natural gravel, crushed rock, crushed concrete or any combination thereof. None of these constituents shall include any argillaceous rock..	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	None	6	G	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) Los Angeles coefficient	Clause 635	-	50				
	6	H	-	Selected granular material	Drainage layer to reinforced soil and anchored earth structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, chalk, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. (Properties (vi), (vii), (viii), (ix), (x), (xi) and (xii) in next column only apply when metallic reinforcing or anchor elements, facing units or fastenings are used.) (Properties (ii) and (v) in next column shall not apply to chalk.) Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 3	6	H	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) plasticity index	BS 1377 : Part 2	Non-plastic					
							(iii) Los Angeles coefficient	Clause 635	-	50				
							(iv) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(v) MCV	Clause 632	App 6/1	App 6/1				
							(vi) pH value	BS 1377 : Part 3	Tab 6/3	Tab 6/3				
							(vii) chloride ion content	BS EN 1744-1	-	Tab 6/3				
							(viii) water soluble (WS) sulfate content	TRL Report 447, Tests No. 1	-	Tab 6/3				
							(ix) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	Tab 6/3				
							(x) restivity	Clause 637	Tab 6/3	-				
							(xi) redox potential	Clause 638	Tab 6/3	-				
							(xii) organic content	BS 1377 : Part 3	-	Tab 6/3				
							(xiii) microbial activity index	Table 6/3	-	Tab 6/3				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	I	-	Selected well graded granular material	Fill to reinforced soil and anchored earth structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, chalk, well burnt colliery spoil or any combination thereof except that chalk shall not be combined with any other constituent. None of these constituents shall include any argillaceous rock. (Properties (i), (ii) and (v) in next column shall not apply to chalk.) (Properties (viii), (ix), (x), (xi), (xii), (xiii) and (xiv) only apply when metallic reinforcing or anchor elements, facing units or fastenings are used.) Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	6	I	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) uniformity coefficient	See Note 5	10	-				
							(iii) SMC of chalk	Clause 634	-	20%				
							(iv) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(v) MCV	Clause 632	App 6/1	App 6/1				
							(vi) effective angle of friction (φ') and effective cohesion (c')	Clause 636	App 6/1	-				
							(vii) coefficient of friction and adhesion (fill/elements)	Clause 639	App 6/1	-				
							(viii) pH value	BS 1377 : Part 3	Tab 6/3	Tab 6/3				
							(ix) chloride ion content	BS EN 1744-1	-	Tab 6/3				
							(x) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	Tab 6/3				
							(xi) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	Tab 6/3				
							(xii) resistivity	Clause 637	Tab 6/3	-				
							(xiii) redox potential	Clause 638	Tab 6/3	-				
							(xiv) organic content	BS 1377 : Part 3	-	Tab 6/3				
							(xv) microbial activity index	Table 6/3	-	Tab 6/3				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	J	-	Selected uniformly graded granular material	Fill to reinforced soil and anchored earth	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, chalk, well burnt colliery spoil or any combination thereof, except that chalk shall not be combined with any other constituent. None of these constituents shall include any argillaceous rock. (Properties (viii), (ix), (x), (xi), (xii), (xiii) and (xiv) in next column only apply when metallic reinforcing or anchor elements, facing units or fastenings are used.) (Properties (i), (ii) and (v) in next column shall not apply to chalk.) Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 3	6	J	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) uniformity coefficient	See Note 5	5	10				
							(iii) SMC of chalk	Clause 634	-	20%				
							(iv) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(v) MCV	Clause 632	App 6/1	App 6/1				
							(vi) effective angle of friction (φ') and effective cohesion (c')	Clause 636	App 6/1	-				
							(vii) coefficient of friction and adhesion (fill/elements)	Clause 639	App 6/1	-				
							(viii) pH value	BS 1377 : Part 3	Tab 6/3	Tab 6/3				
							(ix) chloride ion content	BS EN 1744-1	-	Tab 6/3				
							(x) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	Tab 6/3				
							(xi) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos 2 and 4	-	Tab 6/3				
							(xii) resistivity	Clause 637	Tab 6/3	-				
							(xiii) redox potential	Clause 638	Tab 6/3	-				
							(xiv) organic content	BS 1377 : Part 3	-	Tab 6/3				
							(xv) microbial activity index	Table 6/3	-	Tab 6/3				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	K	-	Selected granular material	Lower bedding for corrugated steel buried structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	End product 90% of maximum dry density of BS 1377 : Part 4 (Vibrating hammer method)	6	K	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) uniformity coefficient	See Note 5	5	-				
							(iii) plasticity index	BS 1377 : Part 2	-	6				
							(iv) optimum mc	BS 1377 : Part 4 (vibrating hammer method)	-	-				
							(v) mc	BS 1377 : Part 2	Optimum mc -2%	Optimum mc +1%				
							(vi) MCV	Clause 632	App 6/1	App 6/1				
							(vii) Los Angeles coefficient	Clause 635	-	40				
							(viii) resistivity	Clause 637	2000 ohm cm	-				
							(ix) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	300 mg/l as SO_4				
							(x) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos 2 and 4	-	0.06% as SO_4				
							(xi) chloride ion content	BS EN 1744-1	-	0.025%				
							(xii) pH value	BS 1377 : Part 3	6	9				
							(xiii) sulfide and hydrogen sulfide	Standard textbook of qualitative inorganic analysis	-	Rapid blackening of lead acetate paper				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR	FILL	6	L	-	Selected uniformly graded granular material	Upper bedding for corrugated steel buried structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	None	6	L	-
									BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
								(ii) resistivity	Clause 637	2000 ohm cm	-				
								(iii) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	300 mg/l as SO_4				
								(iv) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	0.06% as SO_4				
								(v) chloride ion content	BS EN 1744-1	-	0.025%				
								(vi) pH value	BS 1377 : Part 3	6	9				
								(vii) sulfide and hydrogen sulfide	Standard textbook of qualitative inorganic analysis	-	Rapid blackening of lead acetate paper				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)			Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within: Lower	Acceptable Limits Within: Upper				
SELECTED GRANULAR FILL	6	M	-	Selected granular material	Surround to corrugated steel buried structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	End product 90% of maximum dry density of BS 1377 : Part 4 (Vibrating hammer method) unless otherwsie stated in App 6/1	6	M	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) uniformity coefficient	See Note 5	5	-				
							(iii) plasticity index	BS 1377 : Part 2	-	6				
							(iv) optimum mc	BS 1377 : Part 4 (vibrating hammer method)	-	-				
							(v) mc	BS 1377 : Part 2	Optimum mc -2%	Optimum mc +1%				
							(vi) MCV	Clause 632	App 6/1	App 6/1				
							(vii) Los Angeles coefficient	Clause 635	-	40				
							(viii) resistivity	Clause 637	2000 ohm cm	-				
							(ix) water soluble (WS) sulfate content	TRL Report 447 Test No. 1	-	300 mg/l as SO_4				
							(x) oxidisable sulfides (OS) content	TRL Report 447 Tests Nos. 2 and 4	-	0.06% as SO_4				
							(xi) chloride ion content	BS EN 1744-1	-	0.025%				
							(xii) pH value	BS 1377 : Part 3	6	9				
							(xiii) sulfide and hydrogen sulfide	Standard textbook of qualitative inorganic analysis	-	Rapid blackening of lead acetate paper				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR	FILL	6	N	-	Selected well graded granular material	Fill to structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	End product 95% of maximum dry density of BS 1377 : Part 4 (vibrating hammer method)	6	N	-
									BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
								(ii) uniformity coefficient	See Note 5	10	-				
								(iii) Los Angeles coefficient	Clause 635	-	40				
								(iv) undrained shear parameters (c and φ)	Clause 633	App 6/1	-				
								(v) effective angle of internal friction (φ') and effective cohesion (c')	Clause 636	App 6/1	-				
								(vi) permeability	Clause 640	App 6/1	-				
								(vii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
								(viii) MCV	Clause 632	App 6/1	App 6/1				
								(ix) slope stability test (where required in App 6/6)	Clause 610	App 6/6					

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	P	-	Selected granular material	Fill to structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, chalk, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. (Properties (i), (ii) and (ix) in next column shall not apply to chalk.) Recycled aggregate except recycled asphalt	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	End product 95% of maximum dry density of BS 1377 : Part 4 (vibrating hammer method)	6	P	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) uniformity coefficient	See Note 5	5	-				
							(iii) IDD of chalk	Clause 634	-	App 6/1				
							(iv) Los Angeles coefficient	Clause 635	-	60				
							(v) undrained shear parameters (c and φ)	Clause 633	App 6/1	-				
							(vi) effective angle of internal friction (φ') and effective cohesion (c')	Clause 636	App 6/1	-				
							(vii) permeability	Clause 640	App 6/1	-				
							(viii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(ix) MCV	Clause 632	App 6/1	App 6/1				
							(x) slope stability test (where required in App 6/6)	Clause 610	App 6/6					

TABLE 6/1: (11/08) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	Q	-	Well graded uniformly graded or coarse granular material	Overlying fill for corrugated steel buried structures	As Class 1A, 1B or 1C granular fill materials, but not to include argillaceous rock, slag or PFA in any proportions. Recycled aggregate except recycled asphalt	As for Class 1A, 1B or 1C with the addition of the following:					6	Q	-
							(i) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	300 mg/l as SO_4				
							(ii) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	0.06% as SO_4				
							(iii) chloride ion content	BS EN 1744-1	-	0.025%				
							(iv) pH value	BS 1377 : Part 3	6	9				
							(v) sulfide and hydrogen sulfide	Standard textbook of qualitative inorganic analysis	-	Rapid blackening of lead acetate paper				
	6	R	-	Selected granular material	For stabilisation with lime and cement to form capping (Class 9F)	Any material, or combination of materials, other than unburnt colliery spoil and argillaceous rock. (Properties (i), (ii) and (iii) in text column, shall not apply to chalk.)	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	Not applicable	6	R	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) mc	BS 1377 : Part 2	App 6/1	-				
							(iii) liquid limit	BS 1377 : Part 2	-	45				
							(iv) plasticity index	BS 1377 : Part 2	-	20				
							(v) organic matter	BS 1377 : Part 3	-	App 6/1				
							(vi) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	3000 mg/l as SO_4				
							(vii) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	0.6% as SO_4				
							(viii) IDD of chalk	Clause 634	-	App 6/1				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED GRANULAR FILL	6	S	-	Selected well graded granular material	Filter layer below subbase	Crushed rock or sand	(i) grading	BS 1377 : Part 2 (On-site)	Tab 6/2	Tab 6/2	-	6	S	-
								BS EN 933-2 (Off-site)	Tab 6/5	Tab 6/5				
							(ii) plasticity index	BS 1377 : Part 2	-	Non-plastic				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED COHESIVE	FILL	7	A	-	Selected cohesive material	Fill to structures	Any material or combination of materials, other than argillaceous rock and materials designated as Class 3 in the Contract. If chalk is used it shall form 100% of constituents. (Properties (i) and (iii) shall not apply to chalk.) (Properties (vii) and (viii) may be increased to 54% and 31% respectively for Lias Clay only and subject to the requirements of Appendix 6/6)	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	End product: 100% of maximum dry density of BS 1377 : Part 4 (2.5 kg rammer method) or a dry density corresponding to 5% air voids at field mc whichever is lower	7	A	-
							(ii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iii) MCV	Clause 632	App 6/1	App 6/1				
							(iv) undrained shear parameters (c and φ)	Clause 633	App 6/1	App 6/1				
							(v) effective angle of internal friction (φ') and effective cohesion (c')	Clause 636	App 6/1	App 6/1				
							(vi) IDD of chalk	Clause 634	App 6/1	App 6/1				
							(vii) liquid limit	BS 1377 : Part 2	-	45				
							(viii) plasticity index	BS 1377 : Part 2	-	25				

TABLE 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)			Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within: Lower	Upper			
SELECTED COHESIVE	FILL	7	B	-	Selected conditioned pulverised fuel ash cohesive material	Fill to structures and to reinforced soil	Conditioned material direct from power station dust collection system and to which a controlled quantity of water has been added	(i) mc	BS 1377 : Part 2	To enable compaction to Clause 612		End product: 95% of maximum dry density of BS 1377 : Part 4 (2.5 kg rammer method)	7	B	-
								(ii) bulk density	BS 1377 : Part 9	App 6/1	App 6/1				
								(iii) undrained shear parameters (c and φ)	Clause 633	App 6/1	-				
								(iv) effective angle of internal friction (φ') and effective cohesion (c')	Clause 636	App 6/1	-				
								(v) coefficient of friction and adhesiion (fill/elements)	Clause 639	App 6/1	-				
								(vi) permeability	Clause 640	App 6/1	-				
								(vii) slope stability test (where required in App 6/6)	Clause 610	App 6/6					

TABLE 6/1: (05/04) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED COHESIVE FILL	7	C	-	Selected wet cohesive material	Fill to reinforced soil	Any material, or combination of materials, other than unburnt colliery spoil, argillaceous rock and chalk. (Properties (viii), (ix), (x), (xi) and (xii) in next column only apply when metallic reinforcing elements, facing units or fastenings are used)	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 1	7	C	-
							(ii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iii) MCV	Clause 632	App 6/1	App 6/1				
							(iv) effective angle of internal friction (φ') and effective cohesion (c')	Clause 636	App 6/1	-				
							(v) coefficient of friction and adhesiion (fill/elements)	Clause 639	App 6/1	-				
							(vi) liquid limit	BS 1377 : Part 2	-	45				
							(vii) plasticity index	BS 1377 : Part 2	-	25				
							(viii) pH value	BS 1377 : Part 3	Tab 6/3	Tab 6/3				
							(ix) chloride ion content	BS EN 1744-1	-	Tab 6/3				
							(x) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	Tab 6/3				
							(xi) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	Tab 6/3				
							(xii) resistivity	Clause 637	Tab 6/3	-				
							(xiii) redox potential	Clause 638	Tab 6/3	-				

TABLE 6/1: (05/04) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED COHESIVE FILL	7	D	-	Selected stony cohesive material	Fill to reinforced soil	Any material, or combination of materials, other than unburnt colliery spoil, argillaceous rock and chalk. (Properties (vi), (vii), (viii), (ix), (x), (xi) and (xii) in next column only apply when metallic reinforcing elements, facing units or fastenings are used)	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	7	D	-
							(ii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iii) MCV	Clause 632	App 6/1	App 6/1				
							(iv) effective angle of internal friction (φ') and effective cohesion (c')	Clause 636	App 6/1	-				
							(v) coefficient of friction and adhesiion (fill/elements)	Clause 639	App 6/1	-				
							(vi) liquid limit	BS 1377 : Part 2	-	45				
							(vii) plasticity index	BS 1377 : Part 2	-	25				
							(viii) pH value	BS 1377 : Part 3	Tab 6/3	Tab 6/3				
							(ix) chloride ion content	BS EN 1744-1	-	Tab 6/3				
							(x) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	Tab 6/3				
							(xi) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	Tab 6/3				
							(xii) resistivity	Clause 637	Tab 6/3	-				
							(xiii) redox potential	Clause 638	Tab 6/3	-				

TABLE 6/1: (11/03) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED COHESIVE FILL	7	E	-	Selected cohesive material	For stabilisation with lime to form capping (Class 9D)	Any material, or combination of materials, other than unburnt colliery spoil	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Not applicable	7	D	-
							(ii) mc	BS 1377 : Part 2	-	App 6/1				
							(iii) MCV	Clause 632	App 6/1	-				
							(iv) plasticity index	BS 1377 : Part 2	10	-				
							(v) organic matter	BS 1377 : Part 3	-	App 6/1				
							(vi) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	App 6/1				
							(vii) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	App 6/1				
							(viii) total potential sulfate (TPS) content	TRL Report 447, Test No. 4	-	App 6/1				
	7	F	-	Selected silty cohesive material	For stabilisation with cement to form capping (Class 9B)	Any material, or combination of materials, other than chalk, unburnt colliery spoil and argillaceous rock	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Not applicable	7	F	-
							(ii) uniformity coefficient	See Note 5	5	-				
							(iii) mc	BS 1377 : Part 2	App 6/1	App 6/1				
							(iv) MCV	Clause 632	App 6/1	App 6/1				
							(v) liquid limit	BS 1377 : Part 2	-	45				
							(vi) plasticity index	BS 1377 : Part 2	-	20				
							(vii) organic matter	BS 1377 : Part 3	-	App 6/1				
							(viii) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	App 6/1				
							(ix) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	App 6/1				
							(x) total potential sulfate (TPS) content	TRL Report 447, Test No. 4	-	App 6/1				

TABLE 6/1: (11/05) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED COHESIVE FILL	7	G	-	Selected conditioned pulverised fuel ash cohesive material	For stabilisation with cement to form capping (Class 9C)	Conditioned material direct from power station dust collection system and to which a controlled quantity of water has been added	(i) mc	BS 1377 : Part 2	App 6/1	App 6/1	Not applicable	7	G	-
							(ii) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	3000 mg/l as SO_4				
							(iii) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	0.6% as SO_4				
							(iv) total potential sulfate (TPS) content	TRL Report 447, Test No. 4	-	1.2% as SO_4				
	7	H	-	Wet, dry, stony or silty cohesive material and chalk	Overlying fill for corrugated steel buried structures	As Class 2A, 2B, 2C, 2D general cohesive fill material or Class 3 chalk fill material, except that argillaceous rock, slag, PFA or any combination thereof shall not be used	As for Class 2A, 2B, 2C, 2D or 3 with the addition of the following					7	H	-
							(i) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	300 mg/l as SO_4				
							(ii) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	0.06% as SO_4				
							(iii) chloride ion content	BS EN 1744-1	-	0.025%				
							(iv) pH value	BS 1377 : Part 3	6	9				

TABLE 6/1: (11/03) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
SELECTED COHESIVE FILL	7	I	-	Selected cohesive material	For stabilisation with lime and cement to form capping (Class 9E)	Any material, or combination of materials, other than unburnt colliery spoil	(i) grading	BS 1377 : Part 2	Tab 6/2	Tab 6/2	Not applicable	7	I	
							(ii) mc	BS 1377 : Part 2	-	App 6/1				
							(iii) MCV	Clause 632	App 6/1	-				
							(iv) plasticity index	BS 1377 : Part 2	10	-				
							(v) organic matter	BS 1377 : Part 3	-	App 6/1				
							(vi) water soluble (WS) sulfate content	TRL Report 447, Test No. 1	-	App 6/1				
							(vii) oxidisable sulfides (OS) content	TRL Report 447, Tests Nos. 2 and 4	-	App 6/1				
							(viii) total potential sulfate (TPS) content	TRL Report 447, Test No. 4	-	App 6/1				

TABLE 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
MISC FILL	8	-	-	Class 1, Class 2 or Class 3 material	Lower trench fill	Any; except there shall not be any stones or lumps of clay >40 mm nominal diameter. Recycled aggregate	(i) mc	BS 1377 : Part 2	App 6/1	App 6/1	Tab 6/4	8	-	-
							(ii) MCV	Clause 632	App 6/1	App 6/1				
STABILISED MATERIALS	9	A	-	Cement stabilised well graded granular material	Capping	Class 6E with addition of cement according to Clause 614	(i) pulverisation	BS 1924 : Part 2	60%	-	Tab 6/4 Method 6	9	A	-
							(ii) bearing ratio	BS 1924 : Part 2	App 6/1	-				
							(iii) mc	BS 1924 : Part 2	App 6/1	App 6/1				
	9	B	-	Cement stabilised silty cohesive material	Capping	Class 7F with addition of cement according to Clause 614	(i) pulverisation	BS 1924 : Part 2	App 6/1	-	Tab 6/4 Method 7	9	B	-
							(ii) MCV immediately before compaction	Clause 632	App 6/1	12				
							(iii) bearing ratio	BS 1924 : Part 2	App 6/1	-				
							(iv) mc	BS 1924 : Part 2	App 6/1	App 6/1				
	9	C	-	Cement stabilised conditioned pulverised fuel ash cohesive material	Capping	Class 7G with addition of cement according to Clause 614	(i) pulverisation	BS 1924 : Part 2	60%	-	End product 95% of maximum dry density of BS 1924 : Part 2 (2.5 kg rammer method)	9	C	-
							(ii) bearing ratio	BS 1924 : Part 2	App 6/1	-				
							(iii) mc	BS 1924 : Part 2	To enable compaction to Clause 612					
	9	D	-	Lime stabilised cohesive material	Capping	Class 7E with addition of lime according to Clause 615	(i) pulverisation	BS 1924 : Part 2	30%	-	Tab 6/4 Method 7	9	D	-
							(ii) MCV immediately before compaction	Clause 632	App 6/1	App 6/1				
							(iii) bearing ratio	BS 1924 : Part 2	App 6/1	-				
							(iv) mc	BS 1924: Part 2	App 6/1	App 6/1				

TABLE 6/1: (11/04) **Acceptable Earthworks Materials: Classification and Compaction Requirements (See footnotes) (continued)**

Class				General Material Description	Typical Use	Permitted Constituents (All Subject to Requirements of Clause 601 and Appendix 6/1)	Material Properties Required for Acceptability (In Addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
							Property (See Exceptions in Previous Column)	Defined and Tested in Accordance with:	Acceptable Limits Within:					
									Lower	Upper				
STABILISED MATERIALS	9	E	-	Lime and cement stabilised cohesive material	Capping	Class 7I with addition of lime and cement according to Clause 643	(i) pulverisation	BS 1924 : Part 2	30%	-	Tab 6/4 Method 7	9	E	-
							(ii) MCV immediately before completion	Clause 632	App 6/1	App 6/1				
							(iii) bearing ratio	BS 1924 : Part 2	App 6/1	-				
							(iv) mc	BS 1924 : Part 2	App 6/1	App 6/1				
	9	F	-	Lime and cement stabilised well graded granular material	Capping	Class 6R with addition of lime and cement according to Clause 643	(i) pulverisation	BS 1924 : Part 2	60%	-	Tab 6/4 Method 6	9	F	-
							(ii) bearing ratio	BS 1924 : Part 2	App 6/1	-				
							(iii) mc	BS 1924 : Part 2	App 6/1	App 6/1				

Footnotes to Table 6/1

1. App = Appendix
2. Tab = Table
3. Where in the Acceptable Limits column reference is made to App 6/1, only those properties having limits ascribed to them in Appendix 6/1 shall apply. Where Appendix 6/1 gives limits for other properties not listed in this Table such limits shall also apply.
4. (05/04) Where BS 1377 : Part 2 is specified for mc, this shall mean BS 1377 : Part 2 or BS EN 1097-5 as appropriate.
5. Uniformity coefficient is defined as the ratio of the particle diameters D_{60} to D_{10} on the particle-size distribution curve, where:
   D_{60} = particle diameter at which 60% of the soil by weight is finer
   D_{10} = particle diameter at which 10% of the soil by weight is finer
6. (11/04) The limiting values for Class U1B material are given in Appendix 6/14 and Appendix 6/15.

TABLE 6/2: (05/04) **Grading Requirements for Acceptable Earthworks Materials Other Than Classes 6F4, 6F5 and 6S**

Percentage by Mass Passing the Size Shown																					
Class	**Size (mm)**		**Size(mm) BS Series**													**Size (microns) BS Series**				**Size (micr-ons)**	**Class**
	500	**300**	**125**	**90**	**75**	**37.5**	**28**	**20**	**14**	**10**	**6.3**	**5**	**3.35**	**2**	**1.18**	**600**	**300**	**150**	**63**	**2**	
1A		100	95-100																<15		1A
1B			100																<15		1B
1C	100		10-95													0-25			<15		1C
2A & 2B			100											80-100					15-100		2A & 2B
2C			100											15-80					15-80		2C
2D			100																80-100	0-20	2D
6A	100									0-100		0-85				0-45			0-5		6A
6B	100		0-10																		6B
6C			100			0-100					0-100		0-35	0-10		0-2					6C
6D										100		89-100		60-100	30-100	15-80	5-48	0-15 except 0-20 for crushed rock			6D
6E & 6R			100	85-100						25-100						10-100			<15		6E & 2R
6F1					100	75-100				40-95		30-85				10-50			<15		6F1
6F2			100	80-100	65-100	45-100				15-60		10-45				0-25			0-12		6F2
6F3			100	80-100	65-100	45-100				15-60		10-45				0-25			0-12		6F3
6H								100				60-100			15-45	0-25		0-5			6H
6I & 6J			100		85-100				25-100					15-100		9-100			<15		6I & 6J
6K								100											0-10		6K
6L										100		89-100		60-100	30-100	15-100	5-70	0-15 except 0-20 for crushed rock			6L

TABLE 6/2: (11/05) **Grading Requirements for Acceptable Earthworks Materials (continued)**

Percentage by Mass Passing the Size Shown																					
Class	Size (mm)		Size(mm) BS Series													Size (microns) BS Series				Size (micr-ons)	Class
	500	300	125	90	75	37.5	28	20	14	10	6.3	5	3.35	2	1.18	600	300	150	63	2	
6M					100														0-10		6M
6N & 6P					100														<15		6N & 6P
6S					100									60-100		30-90		4-45	0-16		6S
7A					100														15-100		7A
7C			100		85-100				83-100					80-100		60-100			15-45	0-20	7C
7D			100		85-100				40-90					15-79		15-75			15-45	0-20	7D
7E					100		95-100												15-100		7E
7F			100																15-100		7F
7I					100		95-100												15-100		7I

TABLE 6/4: Method Compaction for Earthworks Materials: Plant and Methods (Method 1 to Method 6)
(This Table is to be read in conjunction with sub-Clause 612.10)

Type of Compaction Plant	Ref No.	Category	Method 1		Method 2		Method 3		Method 4		Method 5		Method 6		
			D	N#	D	N#	D	N#	D	N	D	N	N for D = 110 mm	N for D = 150 mm	N for D = 250 mm
Smoothed wheeled roller (or vibratory roller operating without vibration)		Mass per metre width of roll:													
	1	over 2100 kg up to 2700 kg	125	8	125	10	125	10*	175	4	unsuitable		unsuitable	unsuitable	unsuitable
	2	over 2700 kg up to 5400 kg	125	6	125	8	125	8*	200	4	unsuitable		16	unsuitable	unsuitable
	3	over 5400 kg	150	4	150	8	unsuitable		300	4	unsuitable		8	16	unsuitable
Grid roller		Mass per metre width of roll:													
	1	over 2700 kg up to 5400 kg	150	10	unsuitable		150	10	250	4	unsuitable		unsuitable	unsuitable	unsuitable
	2	over 5400 kg up to 8000 kg	150	8	125	12	unsuitable		325	4	unsuitable		20	unsuitable	unsuitable
	3	over 8000 kg	150	4	150	12	unsuitable		400	4	unsuitable		12	20	unsuitable
Deadweight tamping roller		Mass per metre width of roll:													
	1	over 4000 kg up to 6000 kg	225	4	150	12	250	4	350	4	unsuitable		12	20	unsuitable
	2	over 6000 kg	300	5	200	12	300	3	400	4	unsuitable		8	12	20
Pneumatic-tyred roller		Mass per wheel:													
	1	over 1000 kg up to 1500 kg	125	6	unsuitable		150	10*	240	4	unsuitable		unsuitable	unsuitable	unsuitable
	2	over 1500 kg up to 2000 kg	150	5	unsuitable		unsuitable		300	4	unsuitable		unsuitable	unsuitable	unsuitable
	3	over 2000 kg up to 2500 kg	175	4	125	12	unsuitable		350	4	unsuitable		unsuitable	unsuitable	unsuitable
	4	over 2500 kg up to 4000 kg	225	4	125	10	unsuitable		400	4	unsuitable		unsuitable	unsuitable	unsuitable
	5	over 4000 kg up to 6000 kg	300	4	125	10	unsuitable		unsuitable		unsuitable		12	unsuitable	unsuitable
	6	over 6000 kg up to 8000 kg	350	4	150	8	unsuitable		unsuitable		unsuitable		12	unsuitable	unsuitable
	7	over 8000 kg up to 12000 kg	400	4	150	8	unsuitable		unsuitable		unsuitable		10	16	unsuitable
	8	over 12000 kg	450	4	175	6	unsuitable		unsuitable		unsuitable		8	12	unsuitable
Vibratory tamping roller		Mass per metre width of a vibrating roll:													
	1	over 700 kg up to 1300 kg	100	12	100	12	150	12	100	10	unsuitable		unsuitable	unsuitable	unsuitable
	2	over 1300 kg up to 1800 kg	125	12	125	12	175	12*	175	8	unsuitable		12	unsuitable	unsuitable
	3	over 1800 kg up to 2300 kg	150	12	150	12	200	12*	unsuitable		unsuitable		8	12	unsuitable
	4	over 2300 kg up to 2900 kg	150	9	150	9	250	12*	unsuitable		400	5	6	10	unsuitable
	5	over 2900 kg up to 3600 kg	200	9	200	9	275	12*	unsuitable		500	6	6	10	unsuitable
	6	over 3600 kg up to 4300 kg	225	9	225	9	300	12*	unsuitable		600	6	4	8	unsuitable
	7	over 4300 kg up to 5000 kg	250	9	250	9	300	9*	unsuitable		700	6	3	7	12
	8	over 5000 kg	275	9	275	9	300	7*	unsuitable		800	6	3	6	10

TABLE 6/4: Method Compaction for Earthworks Materials: plant and Methods (Method 1 to Method 6)
(This Table is to be read in conjunction with sub-Clause 612.10)

Type of Compaction Plant	Ref No.	Category	Method 1		Method 2		Method 3		Method 4		Method 5		Method 6		
			D	N#	D	N#	D	N#	D	N	D	N	N for D = 110 mm	N for D = 150 mm	N for D = 250 mm
Vibratory roller		Mass per metre width of a vibratory roll:													
	1	over 270 kg up to 450 kg	unsuitable		75	16	150	16	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	2	over 450 kg up to 700 kg	unsuitable		75	12	150	12	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	3	over 700 kg up to 1300 kg	100	12	125	10	150	6	125	10	unsuitable		16	unsuitable	unsuitable
	4	over 1300 kg up to 1800 kg	125	8	150	8	200	10*	175	4	unsuitable		6	16	unsuitable
	5	over 1800 kg up to 2300 kg	150	4	150	4	225	12*	unsuitable		unsuitable		4	6	12
	6	over 2300 kg up to 2900 kg	175	4	175	4	250	10*	unsuitable		400	5	3	5	11
	7	over 2900 kg up to 3600 kg	200	4	200	4	275	8*	unsuitable		500	5	3	5	10
	8	over 3600 kg up to 4300 kg	225	4	225	4	300	8*	unsuitable		600	5	2	4	8
	9	over 4300 kg up to 5000 kg	250	4	250	4	300	6*	unsuitable		700	5	2	4	7
	10	over 5000 kg	275	4	275	4	300	4*	unsuitable		800	5	2	3	6
Vibrating plate compactor		Mass per m^2 of base plate:													
	1	over 880 kg up to 1100 kg	unsuitable		unsuitable		75	6	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	2	over 1100 kg up to 1200 kg	unsuitable		75	10	100	6	75	10	unsuitable		unsuitable	unsuitable	unsuitable
	3	over 1200 kg up to 1400 kg	unsuitable		75	6	150	6	150	8	unsuitable		unsuitable	unsuitable	unsuitable
	4	over 1400 kg up to 1800 kg	100	6	125	6	150	4	unsuitable		unsuitable		8	unsuitable	unsuitable
	5	over 1800 kg up to 2100 kg	150	6	150	5	200	4	unsuitable		unsuitable		5	8	unsuitable
	6	over 2100 kg	200	6	200	5	250	4	unsuitable		unsuitable		3	6	12
Vibro-tamper		Mass:													
	1	over 50 kg up to 65 kg	100	3	100	3	150	3	125	3	unsuitable		4	8	unsuitable
	2	over 65 kg up to 75 kg	125	3	125	3	200	3	150	3	unsuitable		3	6	12
	3	over 75 kg up to 100 kg	150	3	150	3	225	3	175	3	unsuitable		2	4	10
	4	over 100 kg	225	3	200	3	225	3	250	3	unsuitable		2	4	10
Power rammer		Mass:													
	1	100 kg up to 500 kg	150	4	150	6	unsuitable		200	4	unsuitable		5	8	unsuitable
	2	over 500 kg	275	8	275	12	unsuitable		400	4	unsuitable		5	8	14
Dropping-weight compactor		Mass of rammer over 500 kg weight drop:													
	1	over 1 m up to 2 m	600	4	600	8	450	8	unsuitable		unsuitable		unsuitable	unsuitable	unsuitable
	2	over 2 m	600	2	600	8	unsuitable		unsuitable		unsuitable		unsuitable	unsuitable	unsuitable

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