PHASE 3A REMEDIATION STRATEGY

Mayfield Park
Mayfield, Manchester

for

Mayfield Partnership Ltd



18 / 12 / 2020

COMPLEX CHALLENGES ...
MADE SIMPLE

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DESCRIPTION	DATE	AUTHORS		APPROVED BY
Phase 3a Remediation Strategy Report	18-12-20	Elizabeth Stewart 	Alex Smiles 	Alex Smiles 
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R1	Amendment to Asbestos screening value in material re-use specification	15-01-21	Alex Smiles 	
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COMPLEX CHALLENGES ...
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1.0 Introduction

1.1 Background Information

1.1.1 RoC Consulting has been appointed by the Mayfield Partnership Ltd to produce a Phase 3a Remediation Strategy Report for the proposed development across the Mayfield Park within the wider Mayfield Strategic Regeneration Framework. It is understood that the sites are to be redeveloped for a mix of uses within the Public Open Space use comprising landscaped lawn areas, a wild-scape area with flood storage and a children's play area and café.

1.1.2 The following assessment has been completed to support design and planning requirements for the site's redevelopment and follows on from a number of site investigations relating to the development site, specifically:

1) RoC Consulting 2020 Mayfield Park Phase 2 Site Investigation (ref: ROCPLtd/LD/AS/4153-ROC-XX-XX-RP-ES-P2SI R3)

1.1.3 In addition to the above report, results from the following reports have been drawn upon due to their overlap and close proximity to the Mayfield Park boundary:

1) 2019 Plot O+N Phase 2 Geo-environmental and Geotechnical Assessment by REC Ltd(ref: 106841P2R0)

2) RoC Consulting Plot O an N Phase 2 Site Investigation (ref: ROCPLtd/LD/AS/4134-ROC-XX-XX-RP-ES-P2SI1)

3) RoC Consulting 2019 Plot M Phase 2 Site Investigation (ref: LD/AS/P2/3986)

1.1.4 It is recommended reference be made to the abovementioned reports when reviewing the current assessment.

1.1.5 An indication of the approved development layout has been provided within Appendix A. The following Phase 3a Remediation Strategy has been collated to support the pre-commencement planning condition discharge associated with the planning application ref: 124972/FO/2019 relating to the site's development.

1.1.6 A separate Remediation Strategy has been developed specifically for Plots O, N and M within the Mayfield Strategic Regeneration Framework (ref: 4153-ROC-XX-XX-RP-ES-P3RS1). Recommendations made in this report have been designed to be complementary to those within the Remediation Strategy for Plots O, N and M; specifically, the requirements for replacement and re-use of Made Ground.

1.1.7 This document provides details on the remediation strategy of ground contamination across the site to prevent potential risk to identified receptors at the site. The report also outlines the scope of remedial measures required by contractors in order to facilitate the site's safe development.

1.1.8 The scope of the report and its assessment has been based around the site's redevelopment proposals in accordance with the abovementioned redevelopment plans. It should be noted that any subsequent revision of the proposed redevelopment or site boundary away from the above-mentioned drawing may result in the full or partial re-interpretation of this report and assessment.

1.2 Remediation Objectives

1.2.1 The following strategy has been collated to address risks relating to soil and groundwater related contamination issues identified during ground investigation works across the site. Previous ground investigations have identified risks posed toward human health and controlled waters (surface and ground) arising as a result of previous industrial operations across the site.

1.2.2 The strategy seeks to demonstrate how these risks have been considered in the context of the sites proposed redevelopment and how they will be mitigated against (during both construction and operational phases).

1.2.3 Specifically, the objectives of this remediation strategy are as follows:

1) Define sources of contamination identified during ground investigation works and potential receptors that could be at risk of exposure.

2) Consider potential exposure pathways that could be present, during both the construction and operational phases of the development.

3) Where applicable, complete further assessment of contaminants and potential linkages with identified receptors to further qualify risks posed.

4) Consider the ground contamination issues in the context of development proposals and specifically proposed earthworks and other operations at the site.

5) Specify the scope of remediation measures that contractors will be required to enact during the construction process.

6) Specify the scope of site validation and monitoring works that will be required during the sites remediation in order to ensure conformity with this strategy.

7) Specify what, if any, residual risks will remain on conclusion of site remediation works and what mitigation / monitoring measures may be required.

1.2.4 Information on the sites setting and a synopsis on contaminative potential has been provided within Section 2.0 of this report. A specification for remediation works for contractors to review has been provided within Section 3.0 along with associated validation requirements.

1.3 Regulatory Engagement

1.3.1 Initial discussions and a brief review of site conditions have been held with Manchester City Council and the Environment Agency during November 2020. The initial results of ground investigations were discussed, and feedback received which has been considered when collating this strategy.

1.3.2 Subsequent discussion was held with the Environment Agency in January 2021 to agree contaminants of concern and appropriate screening values for the protection of controlled waters (and specifically the Principal Aquifer). These values were discussed in RoC Consulting Technical Note TN1.2 and are reproduced in this report.

2.0 Site Setting and Context

2.1 Background Information

2.1.1 The following synopsis has been collated from various ground investigations completed across the site by RoC Consulting. It is recommended reference is made to the complete findings and recommendations of these reports when reviewing this strategy.

2.1.2 For the purposes of this report the Proposed Mayfield Park site has been subdivided into five distinct zones which will be referred to throughout this report, namely:

- **Zone 1** "Lawns" proposed as a soft landscaped area with grassland, trees, and footpaths
- **Zone 2** "Wild-scape Area" proposed area of landscaped flood water storage
- **Zone 3** "Multi use Game Area" proposed as children's play area with associated café building
- **Zone 4** "South West Park Area" proposed as a landscaped buffer between proposed commercial office development at SRF Masterplan Plots O and M, and the River Medlock

2.1.3 In addition to the above a fieldwork **Zone 5** "Hoyle Street West" has been included within the site investigation and assessment. Whilst falling outside the proposed Park extent (and associated planning application) this portion of the wider SRF Mayfield Masterplan may be affected by associated earth and enabling works. The subdivision of the site has been indicated on RoC Consulting drawing ref ES200 provided within Appendix A; for further information on the proposed layout for each of the above zones please refer to SEW drawing SEW-ZZ-00-SK-L-000111 (provided within Appendix A).

2.2 Site Description

2.2.1 The proposed Park is located to the south east of Manchester City Centre, approximately 100m southeast of Piccadilly Train Station and immediately north of the Mancunian Way, centred at GR 385134, 397578. The site comprises an area of former industry and warehousing with the River Medlock bisecting the site through its centre in a roughly east – west direction (including a small, culverted section to the western extent).

2.2.2 The former Mayfield Railway Station forms the northern boundary of the site, with Baring Street and Hoyle Street forming west and east boundaries, respectively. Currently the site is predominantly hardstanding, with all previous buildings being demolished. The north western corner is currently used as a social events space connected to the Mayfield Depot (Freight Island).

2.2.3 A detailed description of current site operations and setting has been provided for each of the zones below.

Zone 1 "Lawns": Park Lawns

2.2.4 Fieldworks Zone 1 is situated on the northern bank of the River Medlock in the north western area of the wider SRF site. At the time of writing the majority of Zone 1 "Lawns" was occupied by a relic concrete slab relating to a recently demolished warehouse structure that occupied this portion of the site. To the north and east there is a gravel access ramp running into Zone 3 "Multi Use Game Area", and to the west comprises an area of asphalt car parking. The southern boundary is formed by the River Medlock channel and culvert, northern boundary is formed by Freight Island and the Mayfield Depot event space.

2.2.5 Site levels across the Zone 1 portion of the site vary between 34.17mAOD in the south eastern corner adjacent the footbridge to 39.44mAOD with a rise in level noted along the site's northern boundary with the Depot and Freight Island event spaces circa 5m. The River Medlock walls are relatively low in this area, increasing to the eastern and western boundary up to a maximum height circa 6m above river bed level.

Zone 2 "Wild-scape Area": Wild-scape Area

2.2.6 Zone 2 "Wild-scape Area" is situated on a meander in the River Medlock to the central and eastern portion of the wider Mayfield SRF site. This portion of the site is currently occupied by the mostly demolished Dirt Factory (a former indoor cycling venue) to its central and western extent and is currently undergoing archaeological excavation; and a concrete slab associated with a former brewery to the east. A significant change in level is noted between the former Dirt Factory and former brewery site (>4m) which is currently formed from brick and concrete retaining structure of varying age and construction. Zone 2's northern and western boundaries are formed by the River Medlock with the eastern boundary formed by Hoyle Street. Land to the south comprises the "Zone 5" study area including a large waste soil mound.

2.2.7 Site levels across this portion of the site vary between 34.15 and 39.18mAOD with a significant alteration noted between the former Dirt Factory and former brewery sites as noted above. The River Medlock walls are relatively low in this area, increasing to the eastern boundary along the former brewery up to a maximum height circa 5m. A redundant basement structure was uncovered in this area during site investigation field works further details of which are provided within Appendix B.

Zone 3 "Multi Use Game Area": Multi Game Area (MUGA)

2.2.8 The Multi Game Area is situated in the north eastern corner of the site. An access road to Hoyle Street is located in the north and northwest of the zone, centrally and to the west an area of soft landscaping with various stockpiles of material is present. The east of the zone is occupied by a former vehicle maintenance yard elevated 1-2m above the soft landscaped zone with the use of large soil filled metal boxes as retaining walls.

2.2.9 The northern boundary of Zone 3 "Multi Use Game Area" is formed by the Mayfield Depot, the eastern boundary is formed by Hoyle Street, the southern boundary is formed by the River Medlock and the western boundary is formed by the River Medlock and Zone 1 "Lawns".

2.2.10 Site levels across this portion of the site vary between 33.98 and 36.93mAOD with the River Medlock wall to the south increasing in height to the west up to a maximum of 5-5.5m above river bed level.

Zone 4 "South West Park Area": South West Park Area

2.2.11 The South West Park Area forms a buffer zone between the River Medlock to the north and proposed commercial office Plots O and M. At the time of writing, this portion of the site was occupied by an area of asphalt car parking in the west, centrally there is a concrete slab associated with an exposed basement structure around 3-4m below the level of the asphalt car park.

2.2.12 The northern boundary of Zone 4 "South West Park Area" is formed by the River Medlock channel and culvert and Zone 2 "Wild-scape Area", to the east the zone is bordered by Zone 2 "Wild-scape Area" and a ramped access road, the southern boundary is formed by a basement structure on top of which the site offices are located, the eastern boundary is formed by Plots O and N and Baring Street.

Zone 5 "Hoyle Street West": Hoyle Street West Area

2.2.13 Hoyle Street West is located in the south eastern corner of the site and comprises an asphalt surfaced area of car parking and access road to the south of the former Dirt Factory in Zone 2 at an elevation of around 37-38mAOD, a small, vegetated area adjacent the site boundary with Bond Street and a yard area known as "Delaney's Yard". Delaney's Yard is currently occupied by a large stockpile mound, the lower elevations of which are around 39.41mAOD rising in the south to a maximum elevation of ~42.20mAOD. The boundaries to Hoyle Street West are formed by Hoyle Street to the west, Zone 2 to the north in the former Dirt Factory and relic slab of the Britannia Brewery, Plot M and Bond Street to the west and the A635 to the south.

2.3 Site History

Site History

2.3.1 With reference to BuroHappold's report and obtained historical records, RoC Consulting drawing ES101 (Appendix A) illustrates the key historical 'phases' of the site; an excerpt is included overleaf with commentary on key historical features within each zone. It is noted a key change occurred post WW2, following the widespread damage caused from aerial bombing (ES103; Appendix A).

2.3.2 The earliest mapping records for the site show a number of potentially contaminative sources these have been broken down by zone below.

2.3.3 **Zone 1 "Lawns"**: Earliest mapping dated 1891 indicates the zone to be occupied by the Mayfield dye and print works across the entire zone with associated filter pools, tanks and chimneys. Several reservoirs are located to the north of the zone associated with the dye and print works.

2.3.4 By 1948 the Chapelfield rubber works previously only to the south of the river has expanded into Zone 1 "Lawns", records from the 1970's show the works renamed as Chapelfield works. Historic mapping dated 1922 indicates Mayfield station immediately to the north and below ground fuel storage to the northwest below what is currently Freight Island.

2.3.5 **Zone 2 "Wild-scape Area**": Earliest mapping dated 1891 indicates the zone to be occupied by the Chapelfield India Rubber Works and the Britannia Brewery (indicated as disused on plans dated 1922 and appearing to be demolished on records dated 1948).

2.3.6 **Zone 3 "Multi Use Game Area":** Earliest mapping dated 1891 indicates the zone to be occupied by residential housing. Records from 1948 and the 1970's indicate the residential housing to have been demolished and a structure is present in the eastern area of the zone. Mayfield station is indicated to the north on mapping dated 1922-1948 but is not present on mapping from the 1970's.

2.3.7 **Zone 4 "South West Park Area":** Earliest mapping dated 1891 indicates the zone to be occupied by the Ardwick Tannery with the Mayfield baths adjacent the western extent. By 1922 the Ardwick Tannery has been converted to be part of the Chapelfield Works (India rubber). An ice factory is indicated to the west of the zone in 1922 and was still present in mapping from the 1970's.

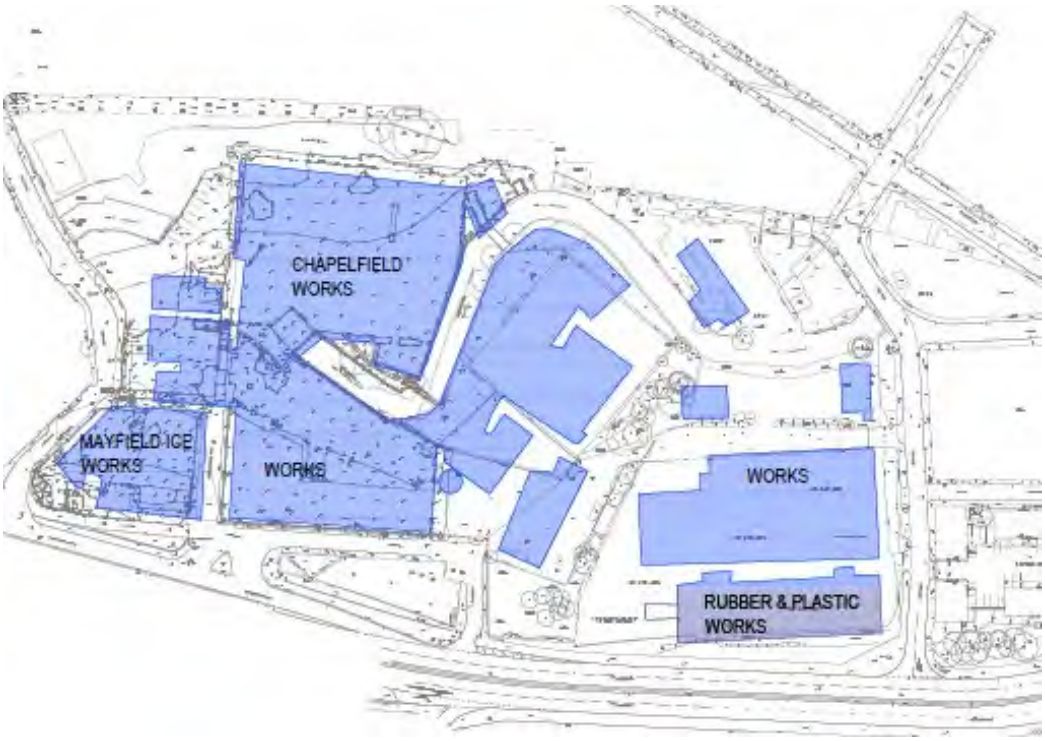
2.3.8 **Zone 5 "Hoyle Street West":** Earliest mapping dated 1891 indicates the area to be occupied by residential housing. This remains the case until 1948 where records depict the residential housing to have been cleared and a residential public house present in the southern area of the zone, along with several other buildings the use of which are unknown. In the present-day car parking area of the zone a larger building is depicted believed to be associated with the Chapelfield India Rubber Works. Mapping dated 1970 shows the Delaney's Yard area of Hoyle street West to be occupied by a rubber and plastic works and a works with several other smaller buildings in the general vicinity.

Excerpt from ES102; Figure 1: 1891



2.3.9 With reference to RoC Consulting drawing ES103, redevelopment of the site was undertaken during the 1950's to clear the bomb damage; with key feature being the expansion of Chapelfield Rubber works to the north side of the river. By the 1970's it was referred only as 'works', however the south eastern corner still produces rubber and plastic. To the northeast corner a vehicle maintenance yard is present.

Excerpt from ES102; Figure 4: 1970



2.4 Site Investigation Summary

2.4.1 The following reports have been used to complete a geo-environmental assessment of the site and the remediation strategy follows on from and is based around recommendations made as part of these reports.

RoC Consulting Mayfield Park Phase 2 Site Investigation, Revision 2

2.4.2 Site investigation works were completed between September 2020 and February 2021. Site investigations across the Mayfield Park Area comprised the formation of cable tool boreholes, Window Sample "mini" boreholes across the site along the existing River Medlock wall, trial pits / foundation exposure pits along the River Medlock wall and to investigate existing foundation constructions and other below ground structures. Following regulatory authority comments, deeper rotary boreholes were drilled across the wider site, with monitoring wells installed into the bedrock's Principal Aquifer.

2.4.3 Ground conditions were reported to comprise variable depths of demolition type made ground materials underlie the proposed park to depths ranging between 0.3 and 5m (mean depth circa 1.8 to 2.0m). These soils were in turn underlain by a combination of poorly compacted Alluvial deposits (at the majority of exploratory hole locations), or the weathered fraction of the Sandstone Bedrock) locally toward the central and southern portion of the site.

2.4.4 Chemical assessment of site soils revealed sources of soil contamination when compared against a "Public Open Space - Park" end use scenario. Contamination broadly comprises elevated levels of heavy metals (primarily arsenic and lead) and numerous PAHs as "hotspots" within Made Ground soils. Asbestos was also reported at multiple locations as loose fibres and asbestos containing materials. Localised hydrocarbon contamination was also noted to varying degrees however the soil concentrations were not found to be in exceedance of screening criteria.

2.4.5 Exceedances of relevant screening criteria for water quality was noted within leachate analysis of Made Ground samples and in groundwater samples (where able to be obtained). A theoretical active pathway between contaminated leachate and the River Medlock was identified.

2.4.6 Subsequent formation of deep monitoring boreholes, sealed into the Sandstone Principal Aquifer, revealed a groundwater table at depths circa 6.0m below ground with a relatively flat flow gradient, loosely corelated with bedrock topography.

2.4.7 Sampling of this water table has revealed localised elevated levels of heavy metals), PAHs and TPH in the same locations where similar hotspots of soil borne contamination are noted. In some cases, this was considered marginal and to pose a low risk however at some locations remedial action has been recommended to reduce the risk to local groundwater quality. No measurable variance in surface water quality was noted up or down stream of the site within the Medlock, which supports the notion the site is not having a significant impact on water quality as it passes the site.

2.4.8 Risks posed by ground gas were not considered applicable for the majority of the site, owing to its public open space end uses. A small existing building is to be retained within the Zone 3 "MUGA" portion of the site and gas risk assessment for which did not identify any need for remediation measures.

2.5 Summary of Identified Risks

2.5.1 The following section comprises a summary of the identified risks to receptors recorded within previous site investigation reports. Reference should be made to the aforementioned reports for a more detailed account of the results.

2.5.2 Risks to human health (both construction operatives and future site users) and controlled waters (River Medlock and Sandstone Aquifer) receptors have been identified. These risks include:

1) Elevated levels of Heavy Metals, Poly Aromatic Hydrocarbons (PAH) and Asbestos present a risk to both construction persons and future site users via their potential inhalation and ingestion when exposed to site soils.

2) Elevated levels of Heavy Metal, PAH and TPH contamination has been identified within the site soils that has the potential to locally impact shallow groundwater quality.

3) Elevated levels of ground gas generation have been identified. However, across the majority of the proposed development absence of confined spaces negates this risk. Mitigation measures may be required within any buildings (such as the proposed café) to protect against risk of ground gas ingress. Construction workers are at risk of ground gas accumulation when working in below ground excavations or enclosed spaces across the wider site.

4) A programme of bulk earthworks will be required in order to facilitate proposed site levels. There is a risk of sediment rich surface run-off flows emanating from the site during rain fall events entering and contaminating the River Medlock. Similarly, such risks will be active during periods of flood, particularly where construction works fall within areas of known flooding.

5) Given the range of substances reported in made ground materials beneath the site a possible risk toward potable water supply is also present. The nature of this risk will be specific to the areas in which proposed new water supply connections will run which, at the time of writing, are yet to be defined. As such further consideration and completion of a United Utilities Pipe Work Risk Assessment will be required at such time when the locations of these service runs are defined.

2.5.3 An indication of the remediation measures required to mitigate against the above concerns is provided within Section 3.0.

2.6 Description of Proposed Earthworks

2.6.1 A programme of enabling earthworks is proposed across the site comprising the phased demolition and site clearance, earthworks including reprofiling and construction of retaining walls for the land bounded by the Mayfield Depot to the north, Baring Street to the west, Hoyle Street to the east, and the Mancunian Way to the south.

Below Ground Obstructions

2.6.2 Ground investigation works have revealed a significant portion of the development site contains numerous below ground obstructions and structures including a circa. 5m deep basement structure (Zone 2), concrete footings and foundations associated with the historic Chapelfield Works (Zone 1) and historical vehicle service area (Zone 3).

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Cut / Fill Design

2.6.3 The earthworks programme to facilitate proposed levels is expected to comprise a site strip of surface level obstructions predominantly comprising concrete slabs and subsequent excavation to below proposed site levels as indicated on SEW plans. It is noted that a 600mm soil capping layer is proposed across the park and as such excavations will be required to at least 600mm below final finished levels (further details of which are provided within Appendix C).

2.6.4 A number of areas of the park are indicated to require up-filling to achieve the proposed levels. In these areas, site-won material in accordance with all specifications will be used as engineered fill following surface strip of unsuitable material.

River Wall Remedial Works

2.6.5 River Wall remedial works are proposed along the full extent of the River Medlock and while detailed proposals are yet to be agreed, for the purposes of this assessment we have assumed a 5m wide excavation to the full depth of the wall will be made to facilitate the works. It is assumed that excavations to the base of the river wall will require the removal of soils to either alluvial deposits or the sandstone bedrock.

Archaeological Investigations – Mayfield Baths

2.6.6 The former Mayfield Baths' site was subsequently fully exposed and excavated by Salford Archaeology as part of the pre-commencement planning condition discharge relating to archaeological surveys. These works have revealed the majority of the swimming baths structure and ancillary walls / drainage are still largely intact. A visual inspection of the area was completed by engineers from RoC Consulting to assess what (if any) areas of potential contamination had been revealed, although no visual or olfactory evidence of significantly impacted soils was noted during this inspection.



Plate 2.0: Mayfield Baths site following excavation

Archaeological Investigations – Chapelfield Dye Works

2.6.7 An extensive area within Zone 1 “Lawns” has been excavated as part of as part pre-commencement planning condition discharge relating to archaeological surveys. These excavations have revealed numerous below ground structures relating to numerous phases of development at this area of the site.

2.6.8 It is believed that structures relating to the initial phase of development has been uncovered, and therefore it is likely these structures are founded within natural soils or the sandstone bedrock.



Plate 2.1: Chapelfield Dye Works Excavation



Plate 2.2: Chapelfield Dye Works Excavations

2.6.9 It is envisaged all excavations completed during this enabling earthworks phases will be re-instated using approved site won material. This material will need to fall within the requirements of the RoC Consulting Earthworks Specification (ref: 4153-ROC-XX-XX-SP-C-D20) to ensure conformity with engineering fill requirements. The material will also need to comply with the chemical specification for reuse outlined within this Phase 3a Remediation Strategy report.

2.6.10 Further details of the proposed enabling earthworks operations have been provided in Appendix C of this report and should be reviewed in conjunction. In addition, the contractor will prepare a Materials Management Strategy for these works (with reference to the recommendations of this report and proposed earthworks strategy) which should also be reviewed when considering enabling earthworks.

3.0 Detailed Remediation Strategy

3.1 Remediation Philosophy and Summary

3.1.1 The scope of these remedial works focusses on the protection of receptors relating to human health and controlled waters at the proposed developments across the Mayfield Park within the Mayfield SRF site.

3.1.2 With reference to the result of the RoC Consulting Phase 2 Site Investigation the following ground contamination concerns have been identified that require remedial measures:

1) Risks posed to future park users arising from Heavy Metal, Poly Aromatic Hydrocarbon and Asbestos contamination within site soils (further details of which are provided in Section 3.2).

2) Risks posed to the underlying Principal Aquifer from elevated concentrations of Heavy Metals and Poly Aromatic Hydrocarbons via the vertical leaching of contaminants (further details of which are provided in Section 3.3).

3) Risks posed to both Human Health and the Principal Aquifer from plumes of Total Petroleum Hydrocarbon Contamination identified on site arising from previous operations (further details of which are provided in Section 3.4).

4) Risks posed to surface water receptors (namely the River Medlock) during construction and earthworks operations (further details of which are provided in Section 3.5).

5) Risks posed to other receptors as a result of site conditions namely below ground concrete structures, potable water supply networks etc ((further details of which are provided in Section 3.6)

3.1.3 Further information and elaboration of the above remedial concerns are provided below.

3.2 Remedial Requirements: Human Health

3.2.1 Elevated levels of contaminants have been identified within site soils that pose a risk to future site users.

Soil Capping Specification

3.2.2 Where areas of soft landscaping are proposed, a clean soil capping layer will be required to a minimum of 600mm (of which 150mm should be topsoil). Deeper soil capping (locally in excess of 1.5m) will be required in proposed tree pits and should be completed in accordance with the SEW Architects landscape and planting specifications.

3.2.3 Soils used in soft landscaping capping should be natural nonreworked origin and will be subject to a program of chemical testing to confirm suitability for use in this context at a frequency of **1 sample / 250m^3** used. The results of this testing should be compared to the specification for reuse in "public open space" provided within Appendix C of the current report (Criteria 1).

3.2.4 In addition, and as discussed in further detail in Section 3.3, soils either placed or left in situ beneath capping in areas of landscaping will need to be verified as not posing a risk to the underlying Principal Aquifer (Criteria 2). Soils being employed in landscaping will also need to satisfy the horticultural and landscape requirements as stipulated by SEW Architects and their sub consultants Tim O'Hare Associates within the Park landscaping specification (Criteria 3).

3.2.5 Table 3.0 (below) indicates the various screening criteria that should be review and applied to soils for use within (or beneath) areas of proposed landscaping.

Table 3.0: Soil Capping System Validation Requirements.

Cover System Depth	Criteria 1 (Human Health)	Criteria 2 (Aquifer)	Criteria 3 (Landscape)
Topsoil (GL - 150mm)	X	X	X
Subsoil (150mm-600mm	X	X	X
Base Strata (MG left in situ or placed)		X	

Criteria 1 – Chemical testing of clean topsoil and subsoil to confirm suitability for use in landscaping in accordance with chemical specification provided in Appendix C.

Criteria 2 – Chemical testing of site won made ground either left in situ or deposited at the base of any capping (provided on Section 3.4, Table 3.1 of current strategy).

Criteria 3 – Physical and chemical requirements of clean topsoil and subsoil to confirm suitability of use against SEW / Tim O'Hare soil landscaping specifications.

Capping Validation

3.2.6 The installation of soil capping is applicable to both areas of formal planting as well as lawn areas with the overall capping depth taken as 600mm below proposed finished floor levels.

3.2.7 The installation of this capping layer will be required evidence of construction and associated chemical verification in accordance with the Table 3.0. The overall capping depth and material sources should be validated on completion of installation in accordance with the below requirements

1) Confirmation of capping thickness via the formation of hand pits on a 25m grid (in large areas of landscaping such as lawns), or at least two pits per individual planting zone / tree pit. Alternatively the capping thickness can be demonstrated via survey methods of both prior to and following installation of soil capping. A reduction to a single hand pit is acceptable for very small (<5m^2) areas of planting or individual tree pits.
2) Photographic records should be taken at each location of a similar standard to that indicated in Fig 3.0 below. An indication of required capping depth should also provided on each photograph (i.e., 600mm or depth of deeper capping in areas such as tree pits).
3) Each hand pit location should be surveyed and displayed on "as built" landscape layout plans with individual references that can be related back to photographic records.
4) Laboratory testing of soils for use in capping should be taken from soils that are intended to be imported onto site; the use of historical testing data provided by suppliers cannot be provided as evidence of validation.
5) Additional information regarding the source of imported soils used in soft landscaping as well as the overall volumes imported should also be provided.
6) If clean site won natural strata is used for capping information regarding the location and origin of materials should be recorded.



Fig 3.0 Example of soil capping depth validation photograph

3.2.8 Both photographic validation pit records, locations and associated soil chemical testing certificates should be collated for inclusion within an appropriate section of the Phase 3b Site Validation report to support pre-operational planning condition discharge.

3.3 Remedial Requirements: Principal Aquifer

3.3.1 As discussed in the RoC Consulting Phase 2 Site Investigation report sources of soil borne contamination have been identified across the site that have the potential to impact groundwater quality within the underlying Principal Aquifer. Leachable concentrations of Heavy Metals (Arsenic, Lead, and Chromium) have been identified at locations across the site in exceedance of published UK DWS screening criteria. The spatial distribution of these contaminants is at random across the site and does not appear to corelate specifically to recent or historic operations, although some clustering is noted particularly in the northern area of the proposed Lawns area.

3.3.2 A combination of the permeable nature of underlying geology across the majority of the site, coupled with proposed removal of existing building / hard standing coverage, may promote leachate being generation from these hotspots and impact water quality within the Principal Sandstone bedrock aquifer. Groundwater sampling from within the Principal Aquifer has revealed localised elevations of Arsenic, PAH and TPH contamination corresponding to areas where hotspots of soil and leachate contamination were identified in near surface soils (further details of which are provided on the enclosed drawings REM101-103 within Appendix A).

3.3.3 The proposed earthworks operation will require the excavation and removal of soils across a significant portion of the site and may, at some locations, remove associated hotspots of contamination contained within made ground deposits.

3.3.4 However, there will also be areas where residual made ground deposits remain in situ beneath the proposed park formation level. Whilst the aforementioned soil capping system will break exposure pathways with future park users and maintenance staff, the potential for leachate generation and movement toward the Principal Aquifer will remain an active pollution linkage (which requires remedial action). To mitigate risks posed from these residual hotspots it is recommended soils from areas indicated on drawing REM101 are excavated and removed (where it is safe and practicable to do so).

3.3.5 Site soils arising from excavations that is proposed to be used beneath buildings, hardstanding or soft landscaping will require chemical validation testing to confirm they do not pose a risk to the Principal Aquifer. Samples should samples obtained at a frequency of **1/ 500m^3 for leachate analysis** against determinands listed in Table 3.1. Similarly, further soil sampling and leachate analysis should be completed in areas where suspected sources of contamination are revealed during earthworks operations. Clean soils (either site won or imported) that are proposed to be used in areas of soft landscaping should conform to the validation requirements outline in Section 3.2 of this strategy document.

3.3.6 Observations from ground investigation works indicate Heavy Metal and PAH contamination hotspots are likely to occur in Ashy wastes used as backfill or within deeper areas of demolition type fill material. As such a watching brief should be adopted during earthworks with additional sampling and tested at suspected hotspots **at a frequency of 1/ 500m^3**.

3.3.7 Made ground material that is to be left in situ beneath the formation layer should not display leachate concentrations above those outlined in Table 3.1 overleaf (as agreed with the Environment Agency in RoC Consulting Technical Note TN1.2, a copy of which is provided in Appendix D).

Table 3.1 Site Specific Screening Criteria for material retained beneath the Park formation.

Contaminant (Leachable levels)	Tier 1 Screening Value (µg/l)	Source
Arsenic	30 µg/l	Site specific values agreed with the EA
Chromium (total)	50 µg/l	The Water Supply (Water Quality) Regulations 2016 (SI2016/619)
Lead	18 µg/l	Site specific values agreed with the EA
Benzo(a)pyrene	0.01 µg/l	The Water Supply (Water Quality) Regulations 2016 (SI2016/619)
Benzo(b)fluoranthene	0.1 µg/l	

3.3.8 Site won crushed aggregate will be generated during earthworks that has the potential to be processed and reuse as part of wider cut / fill earthworks operations. This material will comprise recycled brick and concrete that can be crushed and processed on site to various gradings (as required by the contractors).

3.3.9 This site won "inert" fill is not considered likely to pose a risk to controlled waters (either surface or groundwater) but has the potential to contain Asbestos fragments or elevated Sulphates. As such site won recycled aggregate should be screened **at a frequency of 1 sample per 2000m³** used for Asbestos (ID), pH and 2:1 Sulphate. Where Asbestos is identified Stage 2 quantification should be completed with any material in exceedance of 0.001% by volume deemed unsuitable for use.

3.3.10 Any other site won made ground that is proposed for reuse in earthwork operations (and does not comprise crushed brick / concrete aggregate) should be subject to leachate analysis against the determinands listed in Table 3.0 **at a frequency of 1 sample per 500m³** and also subject to Asbestos ID, pH and 2:1 Sulphate testing at the same frequency as outlined in paragraph 3.3.6 above.

3.3.11 As is the case with proposed landscaping capping, the contractor should ensure samples of site won material proposed as backfill are taken at the required frequency for chemical analysis. The results of this testing should be compared against the values prescribed in the above-mentioned specification prior to use on site. Adequate site records of both material volumes, chemical testing certification should be obtained for use as evidence within the Phase 3b Site Validation report. Photographic records should also be obtained throughout the process as further evidence of its completion.

3.3.12 In addition to the remediation of heavy metal and PAH contamination hotspots remediation works relating to areas of TPH contamination have also been identified (further details of which are provided in Section 3.4 below); residual risks (post remediation works) are described in Section 3.7.

3.4 Remedial Requirements: TPH Contamination Hotspots

3.4.1 The RoC Consulting Phase 2 Site Investigations have revealed several areas of Total Petroleum Hydrocarbon (TPH) contamination present beneath the site arising from previous site operations. With reference to the enclosed drawing REM102, these areas comprise

- **TPH Hotspot #1**: Area of TPH impacted soils and perched ground water to the north and east of the site within the area of the proposed Multi Use Games area.

- **TPH Hotspot #2**: Area of TPH impacted made ground and natural strata relating to a former above ground storage tank situated off site immediately to the south of the proposed Wildscape area.

- **TPH Hotspot #3**: Localised area of TPH impacted soils relating to a former above ground storage tank associated with the former Transport for Greater Manchester depot.

3.4.2 Details for the remediation of each of the abovementioned hotspots are provided below.

TPH Hotspot #1 MUGA

3.4.3 An area of TPH impacted soils (predominantly range diesel range organics) was reported during ground investigations with the former City Excavations HGV service yard. The contamination, which is contained in shallow made ground deposits, is believed to relate to historical vehicle servicing operations in this area and has likely occurred as a result of site practice and an absence of hard standing coverage.

3.4.4 The contamination is confined within the made ground by a low permeability clay layer that underlies the MUGA area (see drawing GEO103 and 104 within Appendix A); sampling from groundwater within the aquifer and adjacent River Medlock do not indicate any impacts have permeated beyond the made ground material. The clay layer in the affected area was found to vary in thickness between 0.7 and 2.0m with more permeable alluvial sands reported underlying this stratum.

3.4.5 The spatial extent of the contaminated material (as delineated by observations during site investigation works) is indicated on drawing REM102 within Appendix A. The actual extent of contamination may vary locally from that shown on REM102 and should be confirmed by contractors during earthwork operations.

3.4.6 Given the proximity of the TPH Hotspot #1 to the River Medlock, and the possible risk of contaminant movement into this water course it is recommended the impacted soils in this area are excavated and disposed of from site. The scope of these hotspot removal works is provided below.

1) Excavate the predefined area(s) on the RoC 'Remediation Strategy TPH Hotspot Locations' drawing (ref 4153 REM103). Remove Made Ground material within the predefined area(s) irrespective of visual/olfactory evidence of hydrocarbon contamination.

2) Contain and pump out any visually impacted water/free product encountered during excavation process and/or pooling/ponding at the base of the Made Ground (natural clay barrier layer).

3) If any visual/olfactory evidence of hydrocarbon contamination is identified at the edges of the predefined area(s) of the excavation, the excavation shall be extended laterally until there is no visual/olfactory evidence of hydrocarbon impact.

4) Extend the excavation to reach the natural clay barrier layer. Pump out any visually impacted water/free product/water perched on top of the natural clay barrier layer.

5) Scrape' the natural clay barrier layer down to visually unimpacted natural material where practicable, however do not excavate more than 200mm into the natural clay (whether visually contaminated or not) to avoid compromising the integrity of the natural clay barrier layer

6) Selectively excavate and stockpile the arisings, as necessary, separately to other materials and remove from site as necessary, as per the agreed RoC Remediation Strategy for the other parts of the Site.

7) Fill the excavation with 'clean' site won material, defined as material meeting the acceptability criteria outlined in Section 3.3 of the current remediation strategy document.

3.4.7 The excavation of TPH Hotspot #1 should be completed from the north to south (i.e., working toward the River Medlock) so that the likelihood of any accidental release of contaminated perched groundwater or leachate is limited as the river wall / channel is approached. Similarly, due care and attention should be given when completing excavations in close proximity to any river walls. A perched groundwater table containing hydrocarbon impacts may be encountered and should be pumped and disposed of from site.

3.4.8 The underlying clay confining layer is likely to prevent any contamination moving into the underlying permeable alluvium / Sandstone bedrock and should be retained intact with excavations into this stratum not to exceed 0.2m. A watching brief should be maintained throughout works to ensure a clay layer remains in situ as far as possible.

3.4.9 Once removed the area of TPH impacted soils should be backfilled to the underside of the proposed formation level with site won clean soils.

TPH Hotspot #2 Plot K& L

3.4.10 An area of TPH impacted soils was noted on land to the south of the proposed park that is believed to relate to a (now removed) above ground fuel storage tank (AST). The AST was formerly contained in a brick and concrete bund which still remains in situ and is currently located in an area of car parking. The area also contains relic refuelling apparatus with no evidence of significant staining on or around the tank bund.

3.4.11 Targeted ground investigations in the area of the AST have revealed a hydrocarbon contamination plume (the approximate extent of which is shown in drawing REM102 within Appendix A) which has permeated through made ground and into the underlying natural alluvial sands.

3.4.12 Impacts were also noted in the Principal Aquifer in this area (along the southern boundary of the proposed park) although no evidence of TPH contamination was noted in adjacent monitoring wells to the north within the actual park area.

3.4.13 The AST is located at a higher elevation than the proposed park, with levels generally sloping to the north and west, which has been the likely mechanism for the movement of the TPH plume toward the park (initially through made ground and onwards into natural strata). The source of contamination is not immediately apparent from inspection of the relic AST structure. Its concrete base and brick wall remains intact with no evidence of damage or cracking; similarly, the area surrounding the tank comprises tarmac hard standing and with a pipe surface water drainage network.

3.4.14 As such it is likely the impacted soils either arise from damage to below ground pipe work, damage to the AST bund that is not immediately apparent from visual inspection, historic spillages and leakage into soils via site drainage networks.

3.4.15 Although this hotspot is located off site it is recommended impacted made ground deposits and shallow natural soils are locally removed and replaced so as to prevent further on-going movement of TPH contamination into the Principal Aquifer. Specifically, the existing AST tank base (and associated infrastructure) should be grubbed out with any impacted made ground / natural strata beneath and within the immediate vicinity (a 5m buffer) also removed. Validation of works should be completed via visual inspection in accordance with the requirements outlined in Hotspot#1.

3.4.16 It would be prudent to confirm the extent of any associated pipe work and other remnant infrastructure from around the AST base in advance of demolition to remove any residual liquid fuel product so as to prevent accidental release during demolition works. Similarly, below fuel interceptor tanks may be present in this area which will also require removal and disposal.

3.4.17 Whilst residual impacted soils will be left in situ beneath the site to the south of the former AST base the logistical issues associated with excavating and removing deep impacted Alluvial and Sandstone bedrock material (up to 5-6m in depth) is not considered justified, owing to the proposed source removal and the fact the TPH does not appear to have migrated into the Park site. Instead, contamination from the TPH plume down gradient will be allowed to natural attenuate and degrade, assisted by the removal of the primary source up gradient.

TPH Hotspot #3 Former TfGM Tank

3.4.18 A localised area of TPH contamination was noted to the north east of the proposed Lawns area relating to a former above ground storage tank. The tank was removed during the recent demolition of the former Transport for Greater Manchester warehouse in 2019 and a subsequent borehole in this area revealed localised hydrocarbon impacts on soils. The spatial extent is limited, with boreholes in the adjacent area not indicating any evidence of TPH contamination.

3.4.19 As with the other identified hotspots the area of contaminated spoil should be excavated until clean unimpacted natural or made ground material is revealed. Excavations should then be backfilled with suitably verified clean site won material. Validation of works should be completed via visual inspection in accordance with the requirements outlined in Hotspot#1.

3.5 Remedial Requirements: Surface Waters

3.5.1 The River Medlock crosses the site toward its center and is at risk of exposure to contaminants during the construction process. These impacts could include the following:

- Soils or construction materials falling into the channel during construction works, particularly works relating to river wall or culvert repairs.

- Uncontrolled release of contaminated shallow / perched water from excavations close to the river.

- Contaminated or sediment rich surface water run off from adjacent sites / material stockpiles entering the water course.

- Accidental spillage or leakage of fuel oil from plant / machinery working adjacent the river channel.

- Inundation from flood events and associated surface water run off back into the river channel from areas of bare soil, material stockpiles and excavations.

3.5.2 Discussions with the Environment Agency regarding protection of the River Medlock and any works undertaken within close proximity of the river are subject to submission of adequate risk assessments and require approval before commencing works. This risk assessment will include specific mitigation measures proposed by the contractors to ensure no impacts occur to the Medlock as a result of site works.

3.5.3 A strategy of surface water run-off control, particularly run off from bare soils, should be developed by the contractor to ensure no untreated waters emanating from the site enter the River Medlock. This requirement will apply to areas of both clean and potentially contaminated soils as allowing even clean sediment ingress into the Medlock could create build up in the channel, water turbidity and reduction in water quality.

3.5.4 Similarly suitable control measures will need to be taken by contractors to protect any groundwaters that are encountered during construction works, as well as the underlying Sandstone Bedrock aquifer.

3.5.5 Hydrological modelling, completed by BuroHappold in support of the current planning consent for Plots O, N and M, indicate the area is at risk of flooding during a 1 in 25 and 1 in 100-year scenarios. In order mitigate against flood waters entering the site from the Medlock (and potential for subsequent sediment rich / contaminated water flows back into the channel) temporary flood defence measures will be constructed in stages to protect the site for flooding and backwash risks.

3.5.6 Further information on these temporary flood protection measures is provided on RoC Consulting drawings SK14 and SK15 (provided within Appendix C).

3.5.7 No evidence has been revealed during ground investigations to suggest sources of contamination beneath the Mayfield Park site are having a significant impact of water quality during site investigations, although hotspots of contamination are noted in close proximity to the Medlock.

3.5.8 It is considered the overall reduction in the site's contaminative potential for the protection of the Principal Aquifer will also reduce the potential for any contaminants migrating into the River Medlock. As noted above the potential for short term exposure pathways will remain during the construction process and will require appropriate mitigation during site works. Of particular note will be the removal of TPH Hotspot#1 (further details of which are provided in Section 3.4). However, we are not of the opinion (with the exception of these control measures) any further ground remediation works are required to protect water quality within the Medlock.

3.6 Remedial Requirements: Other Receptors

Potable Water Supply

3.6.1 Elevated levels of contaminants have been identified that poses a risk to drinking water supply pipes. Completion of a United Utilities Risk Assessment including sampling of soils at depth and location of proposed water supply pipes will be required. Completed risk assessments complete with location plan, soil chemical analysis results and required pipe type will be required for submission to United Utilities for review. Certification of installation of any protective barrier pipes will be required.

Tannery Wastes

3.6.2 The potential for residual tannery wastes has been identified across a small portion of the proposed Park / Plot M office development to the central and southern extent. A technical note relating to the control and mitigation of tannery wastes that may be uncovered in this area has been prepared and included within the RoC Consulting Phase 2 SI report. A copy of this note (TN1.1) has also been included in the current report (see Appendix D) and should be reviewed by all contractors working in the area indicated below.



Fig 3.1: Approx. former Tannery Extent (red dashed line)

General Remedial Comments

3.6.3 It is likely that contaminated material including Asbestos will be encountered during bulk earthworks. All construction persons should be properly briefed on the identification of Asbestos material and, where encountered, earthworks should cease whilst risks are properly considered. The regular damping down of excavations and excavated soils would also be prudent in such instances to prevent dust generation and release from any Asbestos contaminated soils.

3.6.4 It is recommended all construction contractors take reasonable precautions to control environmental impacts that may occur as a result of redevelopment works with respect to soil and groundwater quality. These measures should include (and not be limited to):

1) Any sources of contamination uncovered during site development works should be brought to the immediate attention of RºC Consulting for consideration and comment. As required, the findings and recommendations of the current assessment may require amendment to reflect changes in site condition.

   A watching brief should also be adopted throughout ground works and any suspected sources of grossly contaminated soil brought to the immediate attention of RoC Consulting for consideration and comment.

2) The operation of plant and refuelling facilities should include appropriate provision to reduce the risk of leakage / spillage, particularly into the site's groundwater table or exposed natural soils.

3) All excavated materials stockpiled should be periodically dampened down to control dust release. Similarly, the disposal of any material from site should be completed using covered wagons.

4) During redevelopment the workforce will need to adopt full HSE measures to ensure that the elevated concentrations of contaminants requiring cover, treatment and/or removal are dealt with according to current guidelines and codes of practice. Suitably experienced and competent staff should be employed to carry out the on-site remediation. It is considered the use of full PPE and proper site welfare and hygiene practises will adequately mitigate against risks posed.

5) Dust mitigation measures are to be employed during the site's development, particularly when dealing with made ground that may contain asbestos fibres. Dust mitigation measures include but are not limited to the periodic damping down of stockpiled materials, avoidance of doubling handling and real time air quality / asbestos fibre monitoring (around excavations where Asbestos is reported). Asbestos awareness training should be provided for all groundworkers at the site.

3.6.5 Site personnel are not permitted to enter unstable excavations, nor excavations in which contamination is present, nor unsupported excavations deeper than 1.2m, in accordance with standard HSE protocols. Standard air sampling and monitoring equipment shall be used which emits an audible warning of the presence of any volatile gases and/or low oxygen atmospheres

3.7 Residual Risks

3.7.1 As previously discussed site investigations across the site have indicated sources of contamination within site soils that pose a risk to both human health and controlled waters receptors. It is considered the use of clean 600mm soil capping systems within all areas of landscaping will break any exposure pathways between future site users / park maintenance staff and any residual contamination that may be present.

3.7.2 With regard to controlled waters, localised impacts of groundwater quality have been noted within the Principal Aquifer across the park. These impacts tend to corelate with known areas of grossly contaminated soils and did not occur on a site wide basis. Similarly, no marked deviation in water quality within the River Medlock was noted as it flowed through the site, indicating current interactions between the site and river are not having a significant effect.

3.7.3 This remediation strategy has outlined a number of requirements with regard to the removal and replacement of known sources of contamination across the Park, as well as provided a specification for material being used / retained beneath the site. It is considered these measures will reduce the overall contaminative potential of the site and associated impacts on the Principal Aquifer, leading to betterment of ground water quality within this receptor. Similarly, the proposed treatment of soils and repair works to the existing River Medlock walls will further reduce the likelihood of any impacts occurring from the site on this receptor.

3.7.4 Whilst it is noted water quality has been locally impacted within the Principal Aquifer it is considered the source reduction that will occur as a result of these remedial works will ultimately lead to an improvement in groundwater quality within this receptor, and that (given the relatively localised impacts) the need to pump / treat the groundwater table beneath the site is not warranted in this instance.

3.8 Validation Reporting

3.8.1 The Local Authority and Environment Agency will require evidence the recommendations and requirements outlined within this strategy have been in acted by the contractors during construction works. This validation will take the form of a Phase 3b Site Validation report which will be collated by RºC Consulting on conclusion of site works. The report will outline the following:

- A summary of the desk study, site investigation report and remediation strategy
- Details of who carried out the respective remedial works
- Details and justification of any changes from the original remediation strategy

3.8.2 Substantiating validation data included as follows:

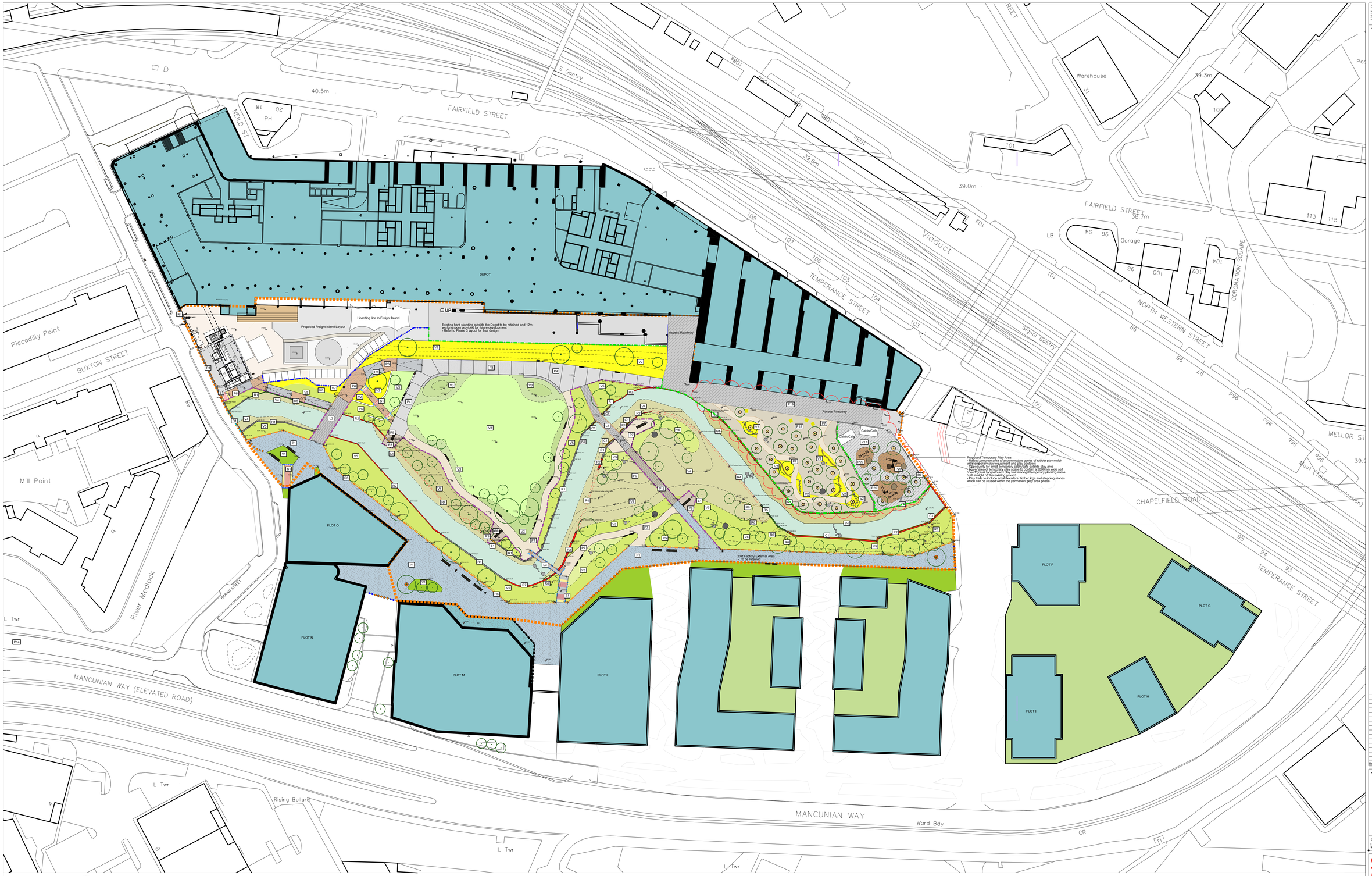
- Laboratory and in-situ test results
- Chemical test results relating to clean up criteria
- Representative plans depicting treated areas and any amendments to strategy as a result of finding further contamination (if necessary)
- Photographic records of excavations (both landscaping and general earthworks)
- Waste management tip tickets and records (for any materials disposed of from site)
- Details of any grossly or unidentified sources of contamination that were revealed during construction works and how they were dealt with
- Evidence of the construction of temporary surface water drainage control and flood protection measures in order to demonstrate to the regulatory authorities that measures were taken to protect the River Medlock

3.8.3 RoC Consulting will attend site periodically throughout the remediation works to monitor and supervise various elements of the above. The suitability for reuse of site won or imported material will also need to be confirmed by RoC Consulting (ideally prior to its placement) via the review of chemical validation certification provided by the contractor.

3.8.4 These validation tests, obtained by an environmental specialist, should be completed in accordance with the frequency and specification provided and issued to RoC Consulting for review in sufficient time to allow our comment prior to use on site. Any material placed without approval from RoC Consulting will be done so at the contractors' own risk.

3.8.5 On completion of site works RoC Consulting will collate the Phase 3b Remediation Strategy for submission to the regulatory authorities for their review and discharge of associated planning conditions. It should be noted the regulatory authorities will require adequate time to review and approve both this validation report (as well as the current Phase 3a Remediation strategy) and agreement of practical completion dates (and other contractual obligations) make adequate provision for these comments / approvals.

APPENDIX A - SITE DRAWINGS



General Notes

Ordnance Survey Licence No. The drawing should not be used to calculate areas for the purchase or sale of land. Dimensions are in millimetres unless otherwise stated. All dimensions should be checked on site by the contractor and any discrepancies to be brought immediately to the attention of the Landscape Architect. Do not scale from this drawing. All work to comply with current regulations, British Standards and Codes of Practice.

Notes

Rev	Date	Reason for Issue	Chk

Keyplan

Scale Bar

sew Studio Egret West

3 Streathouse Yard
Hackney
EC1V 4JD
0207 549 1730

hello@egretwest.com
egretwest.com

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Client
Mayfield Partnership

Project
Mayfield Park

Drawing Title
Grant Aided Phase 1 - Site Overall GA

DRAFT

Project Number	Status
0345	For Information
Scale at A0	Date
1:500	07.07.20
Drawn by	Checked by
MA	SEW

Drawing Number: 0345-SEW-ZZ-00-SK-L-000111
Revision: 90

KEY

Boundaries
- Mayfield Park Boundary

Levels
- Existing level
- Proposed level
- Top of Wall level
- Bottom of Wall level

Paving Types

P1 Paving Type 01
Description: Clay Paving Bricks
Source: UK sourced from the stoke area for heritage continuity (Eg Ridley Brick or equal & approved)
Finish: Diamond chequer square edged
Colour: Blue
Dimensions: 200 x 100 x 65mm
Laying pattern: stretcher bond
Bedding: Stainlec bedding sand and jointing sand, flexible 3mm butt joint, laid to falls
Edging: Kirkley Metal edge for lateral support
Subbase: design to accommodate Pedestrian and occasional maintenance traffic

P2 Paving Type 02
Description: In situ reinforced Concrete surface
Finish: Horse/fine brush finish
Movement joints: located approximately every 5m (to be aligned with architectural features)
Depth: 150mm (To Engineer's specification)
Colour: Integrated Grey
Edging: formwork removed, no edging necessary
Subbase: design to accommodate Vehicular, Servicing & Pedestrian traffic

P3 Paving Type 03
Description: In situ reinforced Concrete surface
Finish: Exposed aggregate
Movement joints: located approximately every 5m (to be aligned with architectural features)
Depth: 150mm (To Engineer's specification)
Colour: Integrated Grey
Edging: formwork removed, no edging necessary
Subbase: design to accommodate Vehicular, Servicing & Pedestrian traffic

P4 Paving Type 04
Description: In situ reinforced Concrete surface
Finish: Good quality brush and trowel finish Movement joints: located approximately every 5m (to be aligned with architectural features)
Depth: 150mm (To Engineer's specification)
Bedding: laid above a dpm
Edging: formwork removed, no edging necessary
Subbase: design to accommodate Vehicular, Servicing & Pedestrian traffic

P5 Paving Type 06
Description: Clay Paving Bricks
Source: UK sourced from the stoke area for heritage continuity (Eg Ridley Brick or equal & approved)
Finish: Rough
Colour: Red
Dimensions: 200 x 100 x 65mm
Laying pattern: stretcher bond
Bedding: Stainlec bedding sand and jointing sand, flexible 3mm butt joint, laid to falls
Edging: Kirkley Metal edge for lateral support
Subbase: design to accommodate Pedestrian and occasional maintenance traffic

P7 Paving Type 07
Description: Self binding gravel
Source: UK sourced (eg CED or equil and approved)
Aggregate size: 0-6mm
Depth: Compacted depth of 50mm
Colour: Integrated
Bedding: LateCover a membrane and within a stabilising mesh
Edging: Improved flood resilience and DDA trafficking
Edging: Kirkley Metal edge for lateral support
Subbase: design to accommodate Pedestrian traffic

P9 Paving Type 09
Description: Steel Grating
Source: UK sourced
Finish: To Engineer's specification
Colour: Weathered Steel
Finish: Pressure-welded slip resistant steel grating
Structure: To Engineer's specification

P13 Paving Type 13
Description: Timber Boardwalk
Finish: Natural Treated Timber
Accessories: Allowance for slip resistant strips
Structure: To Engineer's specification

Tactile Paving Type 01
Description: Tactile Hazard Warning Paving at the top and bottom of steps.
Finishes: Light Buff
Dimensions: 400mm x 400mm

P16 Paving Type 16
Description: Existing Tarmac
Notes: To be retained and cleaned of debries and unwanted materials

P17 Paving Type 17
Description: Existing Concrete
Notes: To be retained and cleaned of debries and unwanted materials

P18 Paving Type 18
Description: Existing Hardstanding
Structural Specification: To be provided by Engineers
Notes: To be retained and cleaned of debries and unwanted materials

P19 Paving Type 19
Description: Proposed Type 1 Sub Base
Notes: To be used as coated is used to form hardstanding area and reused for later phases

P20 Paving Type 20
Description: Proposed Rubber Mulch Play Surface
Notes: 50mm depth of rubber mulch laid onto existing cleaned hard standing to provide impact absorbent play surface

Landscape Structures

L1 Landscape Structure Type 01
Description: Riverside jetty
Source: UK sourced
Finish: To Engineer's specification
Colour: Weathered Steel
Finish: Pressure-welded slip resistant steel grating
Structure: To Engineer's specification

L2 Landscape Structure Type 02
Description: Existing section of culvert retained to form bridge
Structural Specification: To be provided by Engineers.
Allowance: New exposed aggregate concrete deck surface, repointed brickwork, rebuilt and historical jack arch beams exposed and made good.
Design: TBC

L3 Landscape Structure Type 03
Description: Existing steel pipe bridge retained
Structural Specification: To be provided by Engineers
Notes: To be DDA compliant 1100mm high balustrade, repainted and made good.
Design TBC

L4 Landscape Structure Type 04
Description: Existing concrete bridge retained
Structural Specification: To be provided by Engineers
Notes: Existing deck to be removed with all associated fitted. Deck surface made good or replaced with an exposed aggregate concrete finish.
Design TBC

Steps

S1 Step Type 01
Description: Access Steps - Pre cast concrete steps
Finishes: Variety of concrete finishes to differentiate treads from risers
Dimensions: 150mm risers x 280mm treads
Accessories: allowance for handrails either/side, allowance for integrated nosing visibility detail

Retaining Structures & River Edge Treatment

R1 Existing River Wall - Type 01
Wall retained at full height
New coping stone added
Engineer to provide detail of refurbishment scope

R2 Existing River Wall - Type 02
Wall to be reduced in height
New coping stone added
Engineer to provide detail of refurbishment scope

R3 Existing River Wall - Type 03
Wall height lowered to accommodate jetties
Engineer to provide detail of refurbishment scope

R4 Existing River Wall - Type 04
Wall to be lowered to below surface level and vegetated
Engineer to provide specification

R5 Proposed River Wall - Type 05
Proposed concrete retaining wall to Engineer's specification
Wall to be clad in 6mm weathered sheet steel

R6 Proposed Edge - Type 06
Gabion retaining edge to form low level planting terraces and tie into existing wall stepping.
Gabion filled with concrete or brick material harvested from demolition works
Engineer to provide specification

R7 Existing River Wall - Type 07
Existing river walls to be retained within Phase 1. Visual survey to confirm all walls are suitable for temporary uses.

C1 Proposed Cladding - Type 01
Weathered sheet steel cladding 6mm thick. Fixed to face and top of existing wall. Fixing to engineers details

Trees

Tree Specimen 01
Size: Varied
Fixing: Underground guyed
Accessories: Rootrain precinct system
Soil Volume: 20m3 per tree
Target soil volume per tree: 20m3
- An allowance for a root cell system will be required for all trees planted in hard landscape

Tree Specimen 02
Size: Varied
Selected trees for later phases to be planted in Air Pots and planters across temporary locations.

Planting

V1 Planting Type 01
Description: Street Planting

V2 Planting Type 02
Description: Railway Wildflower Meadow & Alpine Steppe Meadow

V3 Planting Type 03
Description: Grassland

V4 Planting Type 04
Description: Wetland Riverside Mosaic

V5 Planting Type 05
Description: Native Habitat Managed for Wildlife

V7 Planting Type 07
Description: Existing Vegetation Retained

Seating & Exercise Equipment

Seating 01
Description: Large rustic timber beams and weathered steel bases
Dimensions:
Large bench - 4000(l) x 450(h) x 1000(w) mm
Small bench - 2000(l) x 450(h) x 500(w) mm
Finish: Treated hardwood timber, galvanised metal fixings and weathered steel base.
Example product: Drifter Benches from Streetlife NL or equal approved -
www.streetlife.nl

Seating 02
Description: Bespoke exposed aggregate concrete base with hardwood timber slatted bench top
Dimensions: Refer to plan
Finish: Treated hardwood timber and galvanised metal fixings
Timber top example product: Solid Top Seats from Streetlife NL or equal approved - www.streetlife.nl

Seating 03
Description:Integrated Boardwalk seating - Weathered steel side panels and hardwood timber slatted bench top
Dimensions: Refer to plan
Finish: Treated hardwood timber and galvanised metal fixings
Example product: Drifter Benches from Streetlife NL or equal approved - www.streetlife.nl

Exercise Feature 01
Description: 5 Outdoor gym/exercise equipment elements
Material: Steel
Dimensions: Varied
Colour: Yallow
Kauppi-Kauppi or equall approved - - www.kauppikauppi.se

Rocks & Boulders
Description: Feature Boulders
Source: Cemex (Rock Armour) & Cornish Landscaping Stone
Size: Varied sizes (indicative sizes shown below).
Structure: Base and structure to Engineer's specification

2500x2500mm Granite Feature Boulder with additional climbing features
2500x2500mm Granite Feature Boulder
1500x1500mm Natural stone quarry blast rocks
500x500mm Natural stone quarry blast rocks

Balustrade & Handrails

Balustrade 01
Description: Steel post and slatted rail balustrade
Dimensions: 1100mm high
Finish: Powder coated steel - colour TBC

Balustrade 02
Description: Varied concrete wall and slatted steel balustrade
Dimensions: 1100mm
Finish: Exposed aggregate concrete and powder coated steel - colour TBC

Bridge Balustrade 03
Description: Existing Baring Street bridge balustrade retained

Bridge Balustrade 04
Description: Powder coated steel post and slatted rail bridge balustrade
Dimensions: 1100mm
Finish: Powder coated steel - colour TBC

Handrail 01
Description: Powder coated steel post and slatted handrail
Dimensions: 900 - 1000mm
Finish: Powder coated steel - colour TBC

Temporary Balustrade 01
Description: Temporary post and rail steel telescopic edge protection
Height: 1100mm

Furniture

Waste & Recycling Bin
Description: Powder coated steel waste and recycling bins product example: Corten Box Bin from Streetlife NL or equal approved -
www.streetlife.nl

Dog Waste Bin
Description: Powder coated steel dog bins

Water Fountain
Description: Powder coated steel water foundations Product example: Caudal water foundation from Santa Cole or equall approved www.santacole.com

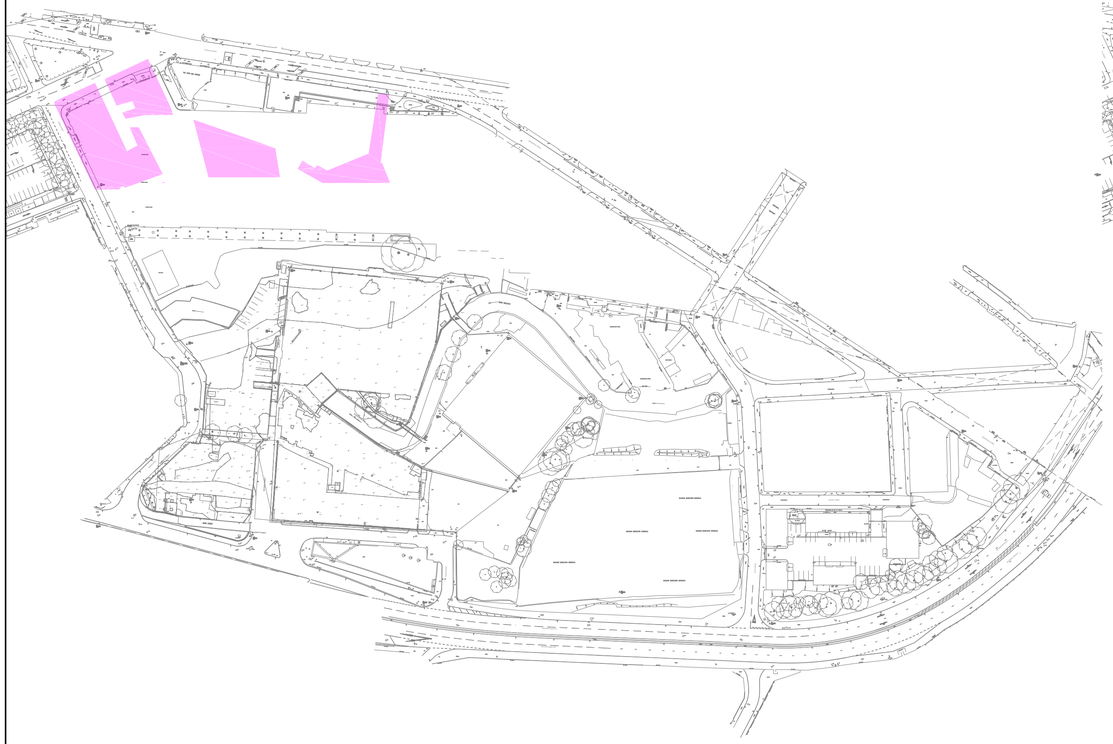
Bollard 01
Description: Existing concrete bollard retained

Bollard 02
Description: Powder coated steel and timber bollards Dimensions: 900mm high x 150mm dia
Finish: Powder coated / colour TBC
Product example: Rough&Ready Bollard from Streetlife NL or equal approved - www.streetlife.nl

Bollard 03
Description: Retractable Powder coated steel bollards Dimensions: 900mm high x 150mm dia
Finish: Powder coated / colour TBC

Cycle Stands
Description: Powder coated cycle stands
Finish: Powder coated - colour TBC
Product example: Corten Bicycle Racks from Streetlife NL or equal approved - www.streetlife.nl

Tree Grille
Description: Circle Tree Grille
Dimensions: 1800mm dia
Finish: Corten with pattern inlay
Product example: Corten Circular Tree Grille with pattern from Streetlife NL or equal approved -
www.streetlife.nl



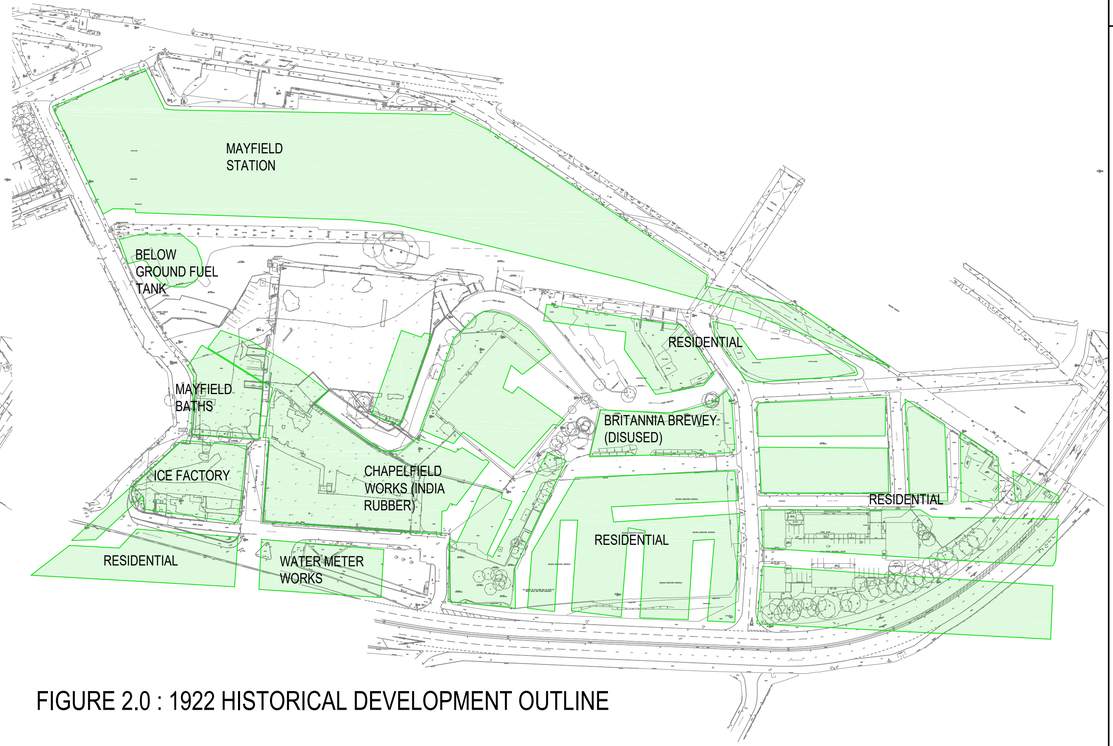
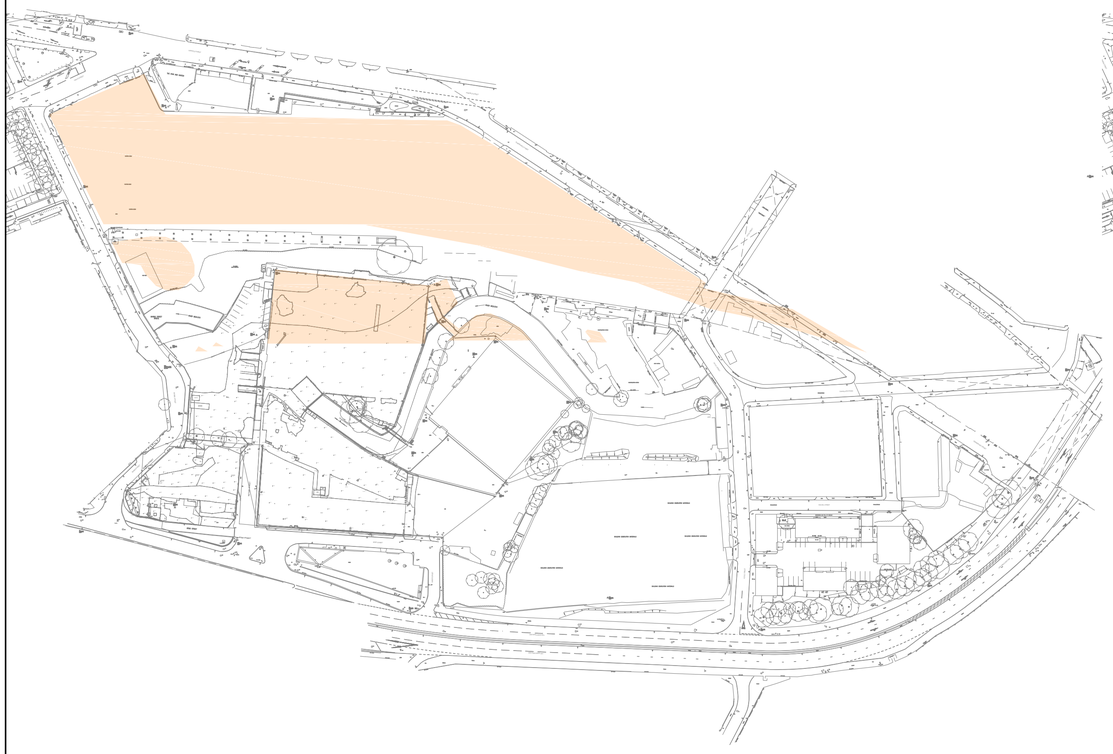


FIGURE 2.0 : 1922 HISTORICAL DEVELOPMENT OUTLINE



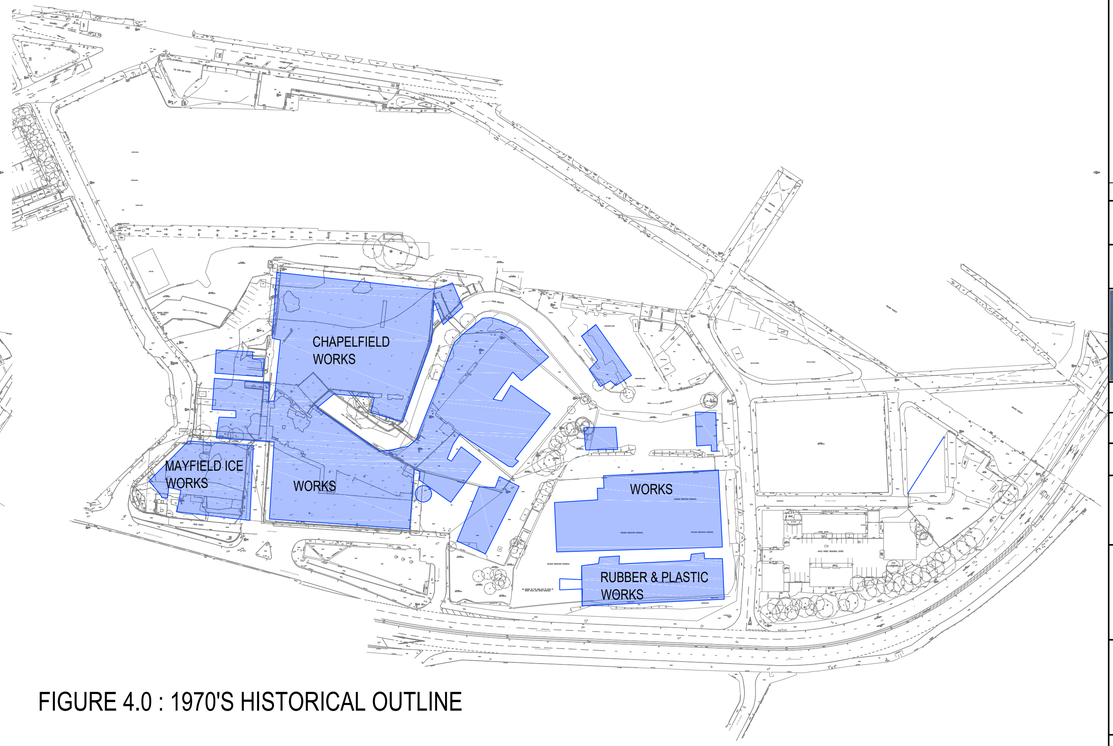


FIGURE 4.0 : 1970'S HISTORICAL OUTLINE

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NOTES

- 1891 DEVELOPMENT OUTLINE
- 1922 DEVELOPMENT OUTLINE
- 1948 DEVELOPMENT OUTLINE
- 1970 DEVELOPMENT OUTLINE

DRAWING NOTES

1) HISTORIC DEVELOPMENT OUTLINES SHOWN AT APPROXIMATE EXTENTS.

2) HISTORICAL DEVELOPMENT DATA OBTAINED FROM COMMERCIAL ENVIRONMENTAL DATABASE AND FREELY AVAILABLE MAPPING RECORDS

3) ROC CONSULTING ACCEPTS NOT RESPONSIBILITY FOR ANY DAMAGES OR LOSS ARISING AS A RESULT OF THE USE OF THIS DRAWING

REV.	DATE	DETAILS	DRN.	CHK.

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CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD

DRAWING TITLE
HISTORIC DEVELOPMENT OVERVIEW

PROJECT No.	DRAWING No.	REV.
4153	ES101	R1

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NOTES

- HIGH EXPLOSIVE BOMB IMPACT LOCATION
- FIRE BOMB IMPACT LOCATION
- DEMOLISHED BUILDING ASSOCIATED WITH BOMBING
- STRUCTURALLY DAMAGED BUILDING ASSOCIATED WITH BOMBING
- BUILDINGS DEMOLISHED POST WW2
- ZONE 1 : MAYFIELD DEPOT
- ZONE 2 : MAYFIELD PARK
- ZONE 3 : BARING ST CAMPUS
- ZONE 4 : HOYLE ST WEST
- ZONE 5 : HOYLE ST EAST

DRAWING NOTES

1) HISTORIC DEVELOPMENT OUTLINES AND BOMBING IMPACT LOCATIONS SHOWN AT APPROXIMATE EXTENTS.

2) HISTORICAL DEVELOPMENT DATA OBTAINED FROM COMMERCIAL ENVIRONMENTAL DATABASE AND FREELY AVAILABLE MAPPING RECORDS.

3) BOMBING IMPACT DATA OBTAINED FORM FREELY AVAILABLE RECORDS.

4) ROC CONSULTING ACCEPTS NO RESPONSIBILITY FOR ANY DAMAGES OR LOSS ARISING AS A RESULT OF THE USE OF THIS DRAWING.

ZONE 1: MAYFIELD DEPOT

ZONE 2: MAYFIELD PARK

ZONE 3: BARING STREET

ZONE 4: HOYLE ST WEST

ZONE 5: HOYLE ST EAST

REV	DATE	DETAILS	DRN	CHK

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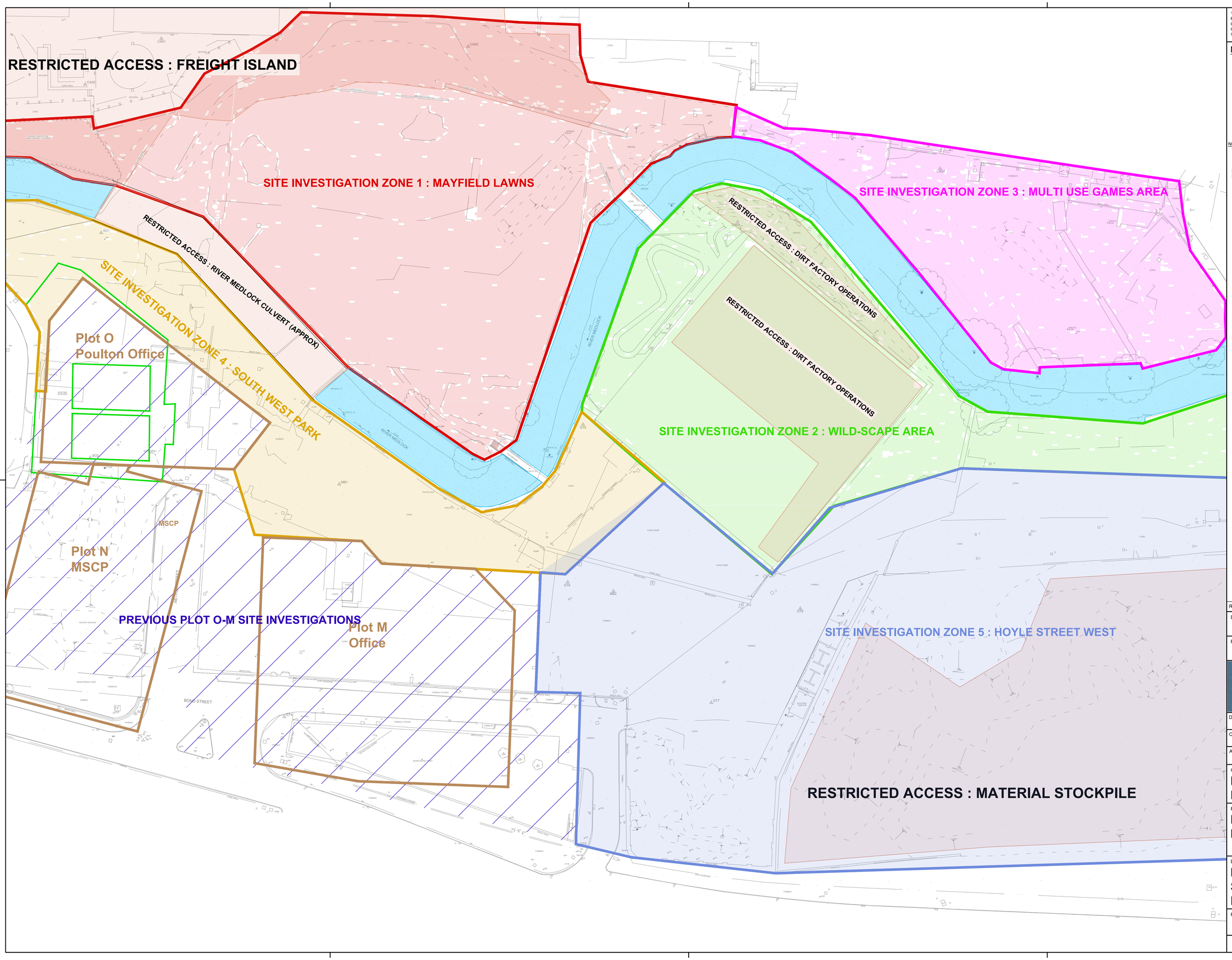
CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD

DRAWING TITLE
UNEXPLODED ORDNANCE MAPPING RECORDS

PROJECT No.	DRAWING No.	REV.
4153	ES102	R1

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NOTES

- SI ZONE 1 : PARK LAWNS
- SI ZONE 2 : WILD SCAPE AREA
- SI ZONE 3: MULTI USE GAME AREA (MUGA)
- SI ZONE 4 : SOUTH WEST PARK AREA
- SI ZONE 5 : HOYLE STREET WEST
- PREVIOUSLY COMPLETED OFFICE PLOT O, N AND M GROUND INVESTIGATIONS

NOTES

1) SITE ZONING INDICATED FOR PURPOSE OF GROUND INVESTIGATION REPORTING AND BASED ON SEW PROPOSED PARK LAYOUT INFORMATION.
2) REFER TO ROC CONSULTING DRAWINGS ES201 to ES204
3) FURTHER INFORMATION ON EXPLORATORY HOLE LOCATIONS.

REV.	DATE	DETAILS	DRN.	CHK.

DRAWING STATUS
INFORMATION

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CLIENT
MAYFIELD PARTNERSHIPS LTD

PROJECT TITLE
MAYFIELD MASTERPLAN

DRAWING TITLE
MAYFIELD PARK SI ZONING PLAN

PROJECT No.	DRAWING No.	REV.
4153	ES200	R1

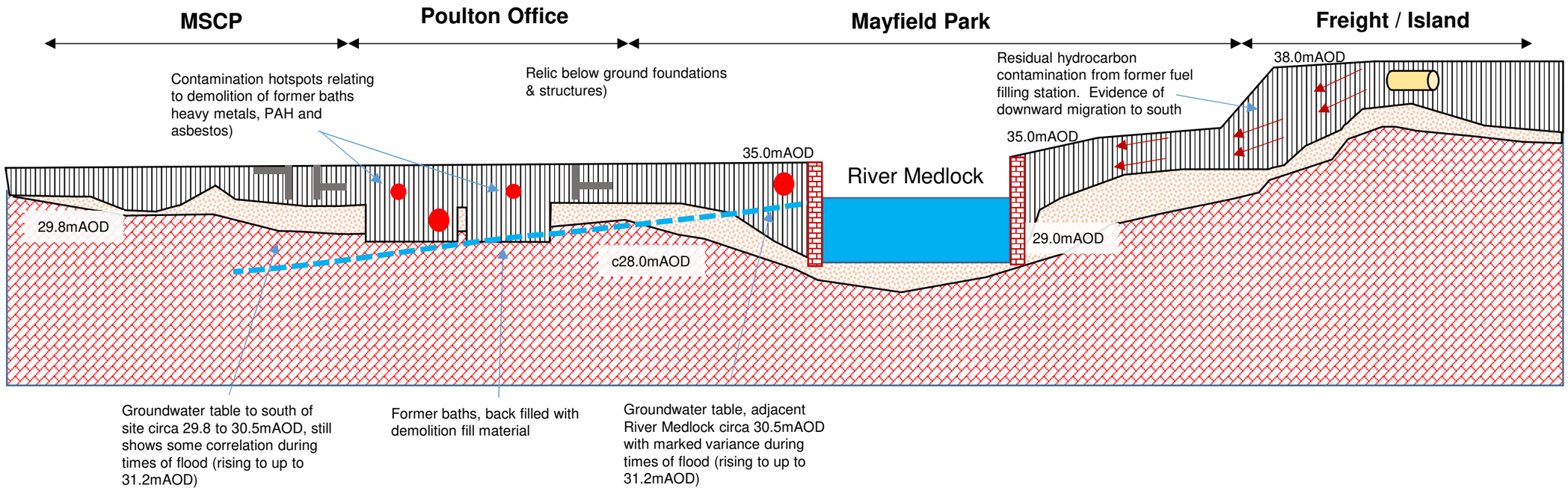
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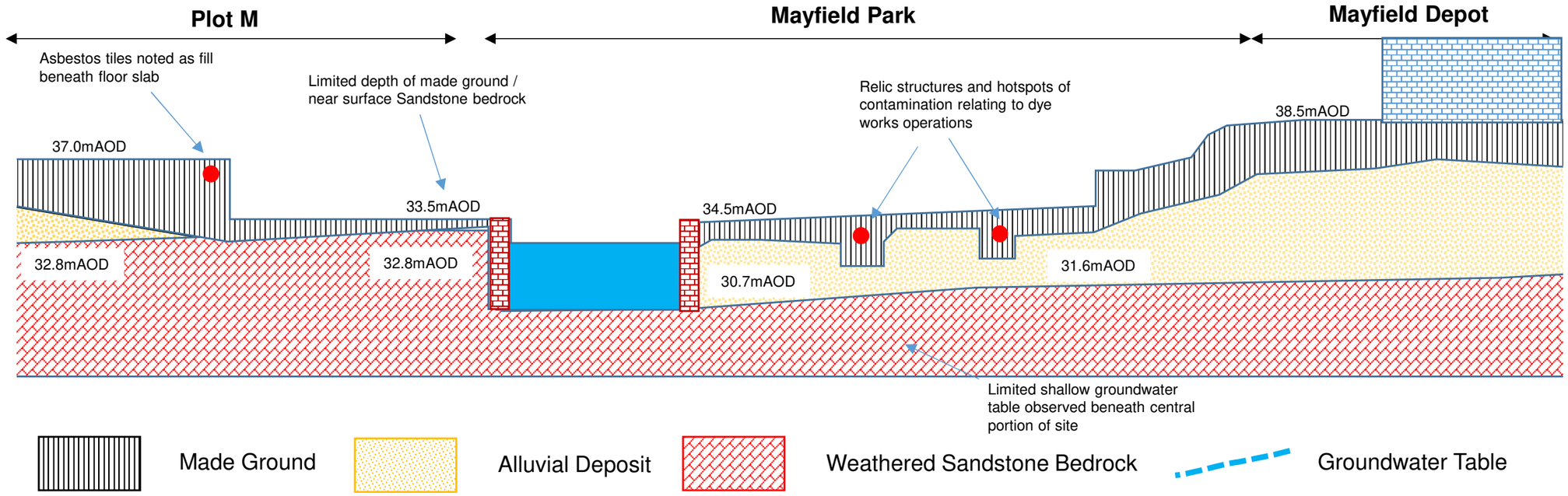
RoC CONSULTING	JOB NO	4153	SKETCH NO	CSM101	DRAWN BY : AS 10 / 12 / 20
	PROJECT TITLE	Mayfield Park	SKETCH TITLE	Conceptual Model Cross Section	

COMPLEX CHALLENGES ... MADE SIMPLE

Section A-A : Western Conceptual Site Section



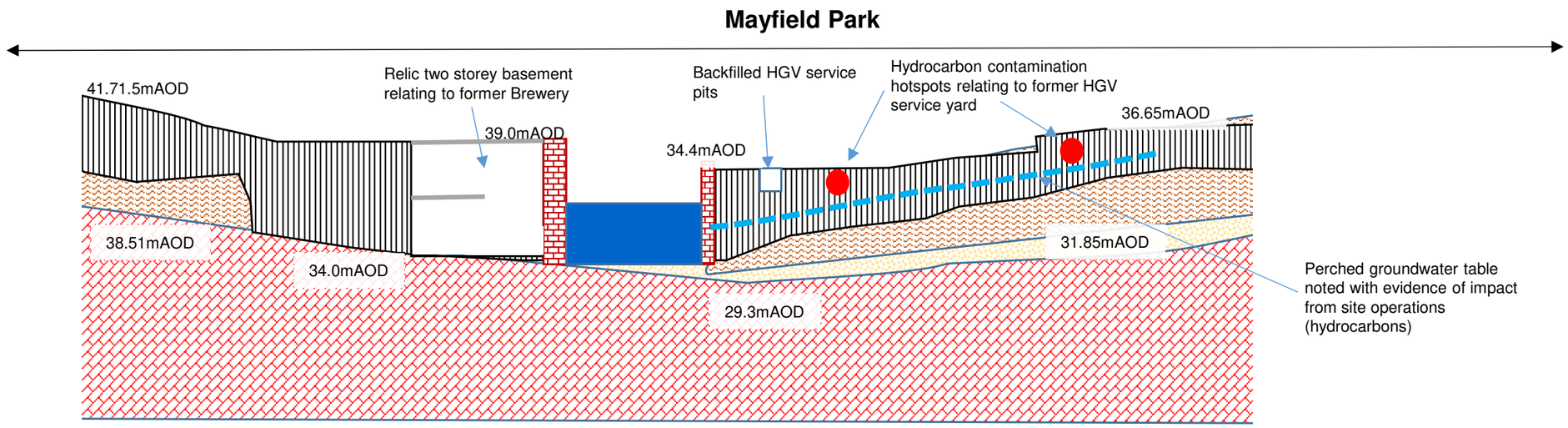
Section B-B : Central Conceptual Site Section



RoC CONSULTING	JOB NO	4153	SKETCH NO	CSM101	DRAWN BY : AS 10 / 12 / 20
	PROJECT TITLE	Mayfield Park	SKETCH TITLE	Conceptual Model Cross Section	

COMPLEX CHALLENGES ... MADE SIMPLE

Section C-C : Eastern Conceptual Site Section



Made Ground

Alluvial Deposit

Weathered Sandstone Bedrock

Groundwater Table

Glacial Clays

JOB NO	4153	SKETCH NO	CSM101	DRAWN BY : AS 10 / 12 / 20
PROJECT TITLE	Mayfield Park	SKETCH TITLE	Conceptual Model Cross Section	

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NOTES

- NO EVIDENCE OF CONTAMINATION REPORTED
- EXCEEDANCE OF TIER 1 LEACHATE VALUES WITH DETAILS
- MAYFIELD PARK BOUNDARY

DRAWING NOTES

1) EXPLORATORY HOLE LOCATIONS PLOTTED TO OS CO-ORDINATES.

2) EXPLORATORY HOLES FORMED AS PART OF THE FOLLOWING REPORTS:
- REC 2019 PLOT O+N SITE INVESTIGATION (REF 10684IP2R0)
- ROC CONSULTING 2019 PLOT M SITE INVESTIGATION (REF LD/AS/P23986)
- ROC CONSULTING 2020 PLOTS O+N SITE INVESTIGATION (REF LD/AS/4134)
- ROC CONSULTING 2020 MAYFIELD PARK SITE INVESTIGATION (REF LD/AS/P24153). PLEASE REFER TO THESE REPORTS FOR FURTHER DETAILS ON GROUND CONDITIONS REPORTED

3) DETAILS OF CONTAMINANTS LISTED AS ABBREVIATIONS:
- Pb: LEAD
- As: ARSENIC
- Cr: CHROMIUM
- BaP: BENZO(a)PYRENE

4) SOILS AND GROUNDWATER SCREENED AGAINST PUBLISHED UKDWS VALUES OR SITE SPECIFIC CRITERIA AS SPECIFIED IN THE ROC CONSULTING PHASE 2 SITE INVESTIGATION REPORT

5) REFER TO ROC CONSULTING MAYFIELD PARK PHASE 3A REPORT FOR DETAILS OF REMEDIAL STRATEGY

2	10/03/21	E3P TRIAL HOLES ADDED	RM	AS

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KEY PLAN

HC SOURCE 3

HC SOURCE 1

HC SOURCE 2

HC SOURCE 2

HC SOURCE 1

HC SOURCE 3

NO EVIDENCE OF CONTAMINATION REPORTED

EVIDENCE OF TPH IMPACTED SOILS

MAYFIELD RARK BOUNDARY

DRAWING NOTES

1) EXPLORATORY HOLE LOCATIONS PLOTTED TO OS CO-ORDINATES.

2) EXPLORATORY HOLES FORMED AS PART OF THE FOLLOWING REPORTS:
- REC 2019 PLOT O+N SITE INVESTIGATION (REF 106841P2R0)
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- ROC CONSULTING 2020 MAYFIELD PARK SITE INVESTIGATION (REF LD/AS/P24153). PLEASE REFER TO THESE REPORTS FOR FURTHER DETAILS ON GROUND CONDITIONS REPORTED

3) DETAILS OF CONTAMINANTS LISTED AS ABBREVIATIONS:
- Pb: LEAD
- As: ARSENIC
- Cr: CHROMIUM
- BaP: BENZO(a)PYRENE

4) SOILS AND GROUNDWATER SCREENED AGAINST PUBLISHED UKDWS VALUES OR SITE SPECIFIC CRITERIA AS SPECIFIED IN THE ROC CONSULTING PHASE 2 SITE INVESTIGATION REPORT

5) REFER TO ROC CONSULTING MAYFIELD PARK PHASE 3A REPORT FOR DETAILS OF REMEDIAL STRATEGY

HC SOURCE 1

DIFFUSE SOURCE OF TPH CONTAMINATION NOTED AT MULTIPLE BOREHOLE LOCATIONS WITHIN INDICATED AREA. SOURCE BELIEVED TO RELATE TO FORMER HGV SERVICE AND REPAIR OPERATIONS IN THIS AREA RELATING TO "CITY EXCAVATIONS".

HYDROCARBON CONTAMINANTS PRESENT IN MADE GROUND AND APPEARS TO BE PERCHED ON TOP OF LOW PERMEABILITY CLAY STRATA.

PRECISE SPATIAL EXTENT TO BE DELINEATED VIA TRIAL TRENCHING AND ALL IMPACTED SOILS AND REMOVED FROM SITE. A 200MM CONFIDENCE SCRAPE SHOULD BE COMPLETED INTO UNIMPACTED NATURAL STRATA AND CONFIRMATORY CHEMICAL TESTS OBTAINED TO CONFIRM NO RESIDUAL CONTAMINANTS REMAIN.

HC SOURCE 2

POINT SOURCE OF CONTAMINATION RELATING TO (NOW REMOVED) ABOVE GROUND STORAGE TANK. TANK BUND AND STRUCTURE STILL REMAIN IN SITU. EVIDENCE OF HYDROCARBON CONTAMINATION WITHIN MADE GROUND ACROSS INDICATED AREA BASED ON BOREHOLE OPERATIONS. SOME DOWN GRADIENT IMPACT OR LEACHING INTO UNDERLYING NATURAL SANDS ALSO NOTED.

PRECISE SPATIAL EXTENT TO BE DELINEATED VIA TRIAL TRENCHING AND ALL IMPACTED SOILS AND REMOVED FROM SITE. A 200MM CONFIDENCE SCRAPE SHOULD BE COMPLETED INTO UNIMPACTED NATURAL STRATA AND CONFIRMATORY CHEMICAL TESTS OBTAINED TO CONFIRM NO RESIDUAL CONTAMINANTS REMAIN.

HC SOURCE 3

POINT SOURCE OF CONTAMINATION RELATING TO (NOW REMOVED) ABOVE GROUND STORAGE TANK. LIMITED AND LOCALISED IMPACTS NOTED IN BOREHOLE FORMED IN THIS AREA. SPATIAL EXTENT TO BE DELINEATED AND REMOVED.

REV.	DATE	DETAILS	DRN.	CHK

DRAWING STATUS: INFORMATION

RIBA STAGE:

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CLIENT: MAYFIELD PARTNERSHIP LTD

PROJECT TITLE: MAYFIELD PARK

DRAWING TITLE: REMEDIATION STRATEGY: ORGANIC HOTSPOT LOCATIONS

PROJECT No.	DRAWING No.	REV.
4153	REM102	1

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RO101

RO102

RO103

RO104

RO105

RO106

RO107

PLOT M BH102

RIVER MEDLOCK

BARKING STREET

MEATHER STREET

BOND STREET

NO EVIDENCE OF CONTAMINATION REPORTED IN AQUIFER

EXCEEDANCE OF TIER 1 GROUNDWATER VALUES WITH DETAILS

MAYFIELD PARK BOUNDARY

DRAWING NOTES

1) EXPLORATORY HOLE LOCATIONS PLOTTED TO OS CO-ORDINATES.

2) EXPLORATORY HOLES FORMED AS PART OF THE FOLLOWING REPORTS:
- REC 2019 PLOT O+N SITE INVESTIGATION (REF 108841P2R0)
- ROC CONSULTING 2019 PLOT M SITE INVESTIGATION (REF LD/AS/P23986)
- ROC CONSULTING 2020 PLOTS O+N SITE INVESTIGATION (REF LD/AS/4134)
- ROC CONSULTING 2020 MAYFIELD PARK SITE INVESTIGATION (REF LD/AS/P24153). PLEASE REFER TO THESE REPORTS FOR FURTHER DETAILS ON GROUND CONDITIONS REPORTED

3) DETAILS OF CONTAMINANTS LISTED AS ABBREVIATIONS:
- Pb: LEAD
- As: ARSENIC
- Cr: CHROMIUM
- BaP: BENZO(a)PYRENE

4) SOILS AND GROUNDWATER SCREENED AGAINST PUBLISHED UKOWS VALUES OR SITE SPECIFIC CRITERIA AS SPECIFIED IN THE ROC CONSULTING PHASE 2 SITE INVESTIGATION REPORT

5) REFER TO ROC CONSULTING MAYFIELD PARK PHASE 3A REPORT FOR DETAILS OF REMEDIAL STRATEGY

REV.	DATE	DETAILS	DRN.	CHK.

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AS	MAR 21	info@rocconsulting.com

CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
REMEDIATION STRATEGY: GWATER HOTSPOT LOCATIONS

PROJECT No.	DRAWING No.	REV.
4153	REM103	1

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COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX B – SOIL REUSE CHEMICAL VALIDATION CRITERIA (SOFT LANDSCAPED ZONES)

Soil Screening Values
For use in Public Open Space

Determinand (mg/kg)		Determinand (mg/kg)	
Heavy Metals		**Petroleum Hydrocarbons**	
Arsenic	170	TPH C5-C6 Aliphatic	95000
Beryllium	63	TPH C>6-C8 Aliphatic	150000
Boron	460000	TPH C>8-C10 Aliphatic	14000
Cadmium	560	TPH C>10-C12 Aliphatic	21000
Chromium (III)	33000	TPH C>12-C16 Aliphatic	25000
Chromium (VI)	220	TPH C>16-C35 Aliphatic	450000
Copper	44000	TPH C>35-C44 Aliphatic	450000
Mercury (Elemental)	25.8	TPH C>5-C7 Aromatic (Benzene)	76000
Mercury (Inorganic)	240	TPH C>7-C8 Aromatic (Toluene)	87000
Mercury (Methylmercury)	68	TPH C>8-C10 Aromatic	7200
Nickel	3400	TPH C>10-C12 Aromatic	9200
Selenium	1800	TPH C>12-C16 Aromatic	10000
Vanadium	5000	TPH C>16-C21 Aromatic	7600
Zinc	170000	TPH C>21-C35 Aromatic	7800
Polyaromatic Hydrocarbons		TPH C>35-C44 Aromatic	7800
Acenaphthene	29000	TPH C>44-C70 Ali and Aro	7800
Acenaphthylene	29000	**BTEX Compounds**	
Anthracene*	150000	Benzene	110
Benzo(a)anthracene*	49	Toluene	87000
Benzo(a)pyrene*"	10	Ethylbenzene	17000
Benzo(b)fluoranthene"	13	**Other Substances**	
Benzo(g,h,i)perylene*"	1400	Asbestos ID	ND
Benzo(k)fluoranthene*"	370		
Chrysene*	93		
Dibenz(a,h)anthracene	1.1		
Fluoranthene*"	6300		
Fluorene	20000		
Indeno(1,2,3-cd)pyrene*"	150		
Naphthalene*	1200		
Phenanthrene*	6200		
Pyrene	15000		
Benzene	110		

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COMPLEX CHALLENGES ...
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APPENDIX C – PROPOSED EARTHWORKS DRAWINGS & SPECIFICATION

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NOTES

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LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND

TOPO — SK008

U/S MADE GROUND — SK010

TOP OF ROCK — SK009

+ 29.87 TOPO LEVELS

REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

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FOR COMMENT

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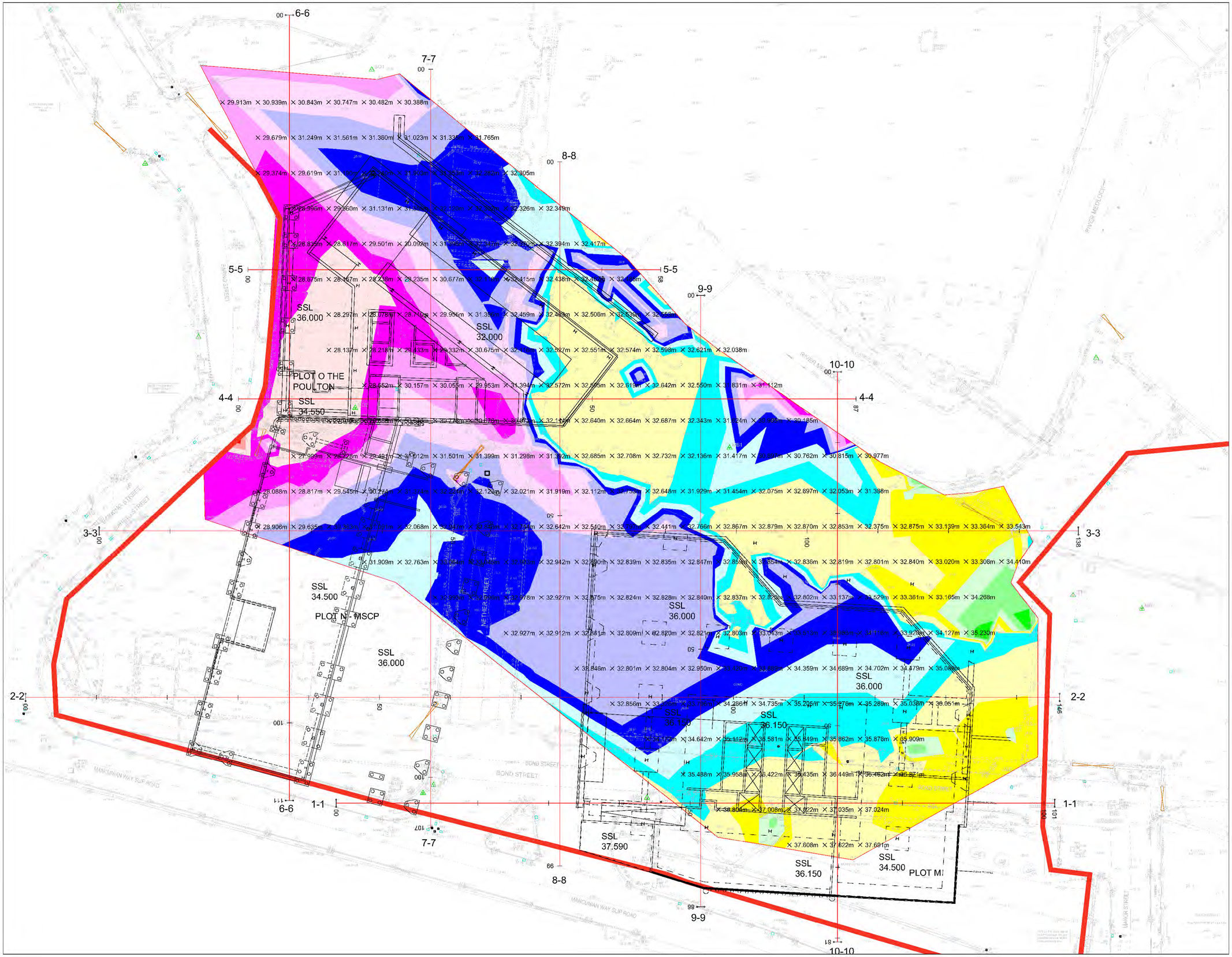
CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
POTS M,N & O
TOPO PLAN

PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV
4153-ROC-XX-XX-DR-C-SK007							P1

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LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND

TOPO — SK008

U/S MADE GROUND — SK010

TOP OF ROCK — SK009

SURFACE LEVEL DATA			
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR
1	-9.00	-8.20	
2	-8.20	-7.40	
3	-7.40	-6.60	
4	-6.60	-5.80	
5	-5.80	-5.00	
6	-5.00	-4.20	
7	-4.20	-3.40	
8	-3.40	-2.60	
9	-2.60	-1.80	
10	-1.80	-1.00	
11	-1.00	-0.20	
12	-0.20	0.60	
13	0.60	1.40	
14	1.40	2.20	
15	2.20	3.00	

THIS DRAWING REPRESENTS THICKNESS OF MATERIAL BETWEEN EXISTING GROUND LEVELS AND UNDERSIDE OF MADE GROUND

TOTAL CUT 20,539m³
TOTAL FILL 261m³

NET CUT 20.279m³

NOTE: VOLUMES ARE TAKEN TO THE BOUNDARY OF THE AVAILABLE S.I INFORMATION & CALCULATED FROM VERTICAL FACE BETWEEN THE STRATAS OMITTING ALL BATTERS

× 33.429m U/S MADE GROUND
+ TOPO LEVELS

REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

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APPRVD. PW	DATE 25.11.20	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
PLOTS M,N & O
ISOPACHYTE DEPTHS
TOPO vs U/S MG

PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV
4153-ROC-XX-XX-DR-C-SK008							P1

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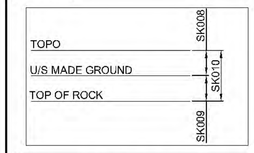
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NOTES

NB: SUBSTRATA GROUND MODEL SHOWN IS AN INTERPRETATION OF THE OVERALL RESULTS OF THE SITE INVESTIGATION AND IS SUBJECT TO REFINEMENT.

LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND



SURFACE LEVEL DATA

NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR
1	-4.00	-3.50	
2	-3.50	-3.00	
3	-3.00	-2.50	
4	-2.50	-2.00	
5	-2.00	-1.50	
6	-1.50	-1.00	
7	-1.00	-0.50	
8	-0.50	0.00	
9	0.00	0.50	

NOTE: VOLUMES ARE TAKEN TO THE BOUNDARY OF THE AVAILABLE S.I INFORMATION & CALCULATED FROM VERTICAL FACE BETWEEN THE STRATAS OMITTING ALL BATTERS

THIS DRAWING REPRESENTS THICKNESS OF UNDERSIDE OF MADE GROUND AND TOP OF ROCK

TOTAL CUT 3,157m³

REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

RIBA STAGE

RoC CONSULTING
Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W rocconsulting.com

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CHECKED PW	DATE 25.11.20	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE -DO NOT SCALE-
APPRVD. PW	DATE 25.11.20	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
PLOTS M,N & O
ISOPACHYTE DEPTHS
U/S MG vs TOP OF ROCK

PROJECT ORIGIN ZONE LVL TYPE ROLE No.	REV
4153-ROC-XX-XX-DR-C-SK009	P1

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LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND

TOPO — SK008

U/S MADE GROUND — SK010

TOP OF ROCK — SK009

SURFACE LEVEL DATA			
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR
1	-10.00	-9.00	
2	-9.00	-8.00	
3	-8.00	-7.00	
4	-7.00	-6.00	
5	-6.00	-5.00	
6	-5.00	-4.00	
7	-4.00	-3.00	
8	-3.00	-2.00	
9	-2.00	-1.00	
10	-1.00	0.00	
11	0.00	1.00	
12	1.00	2.00	

NOTE: VOLUMES ARE TAKEN TO THE BOUNDARY OF THE AVAILABLE S.I INFORMATION & CALCULATED FROM VERTICAL FACE BETWEEN THE STRATAS OMITTING ALL BATTERS

THIS DRAWING REPRESENTS THICKNESS OF EXISTING GROUND LEVELS TO TOP OF ROCK

TOTAL CUT - 23,530m³
TOTAL FILL - 94m³

NET CUT 23,436m³

× 33.429m TOP OF ROCK LEVELS
TOPO LEVELS

REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
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APPRVD PW	DATE 25.11.20	EMAIL FOR DRAWINGS info@rocconsulting.com

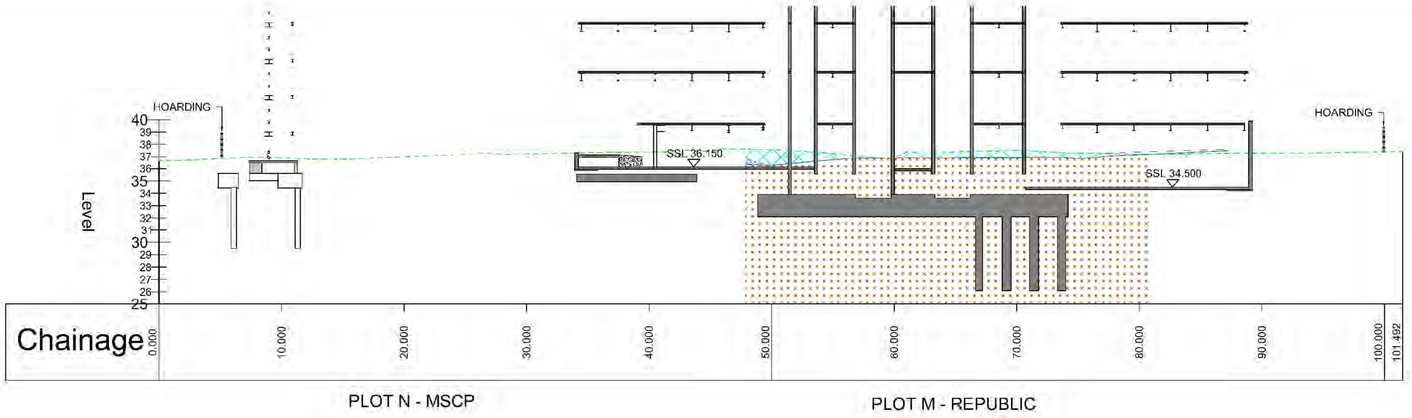
CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

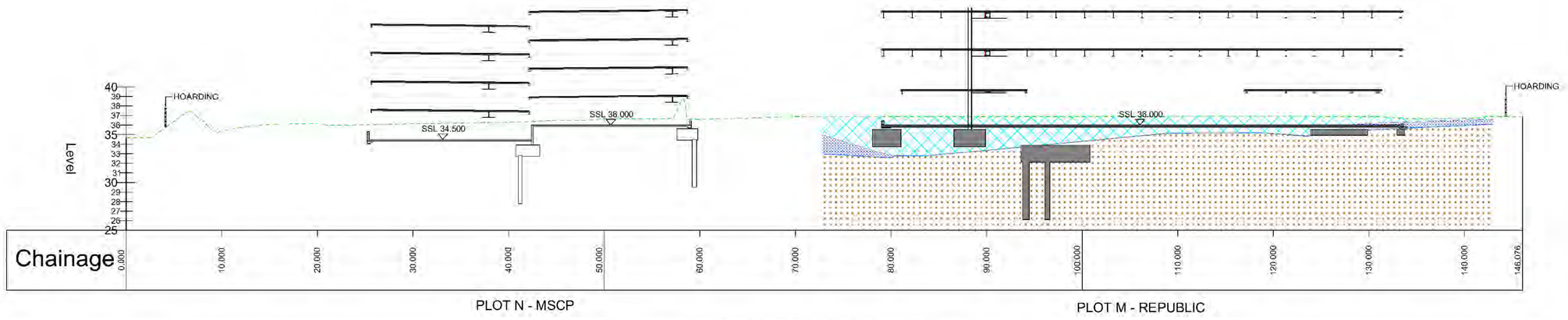
DRAWING TITLE
PLOTS M,N & O
ISOPACHYTE DEPTHS
TOPO vs TOP OF ROCK

PROJECT ORIGIN ZONE LVL TYPE ROLE No.	REV
4153-ROC-XX-XX-DR-C-SK010	P1

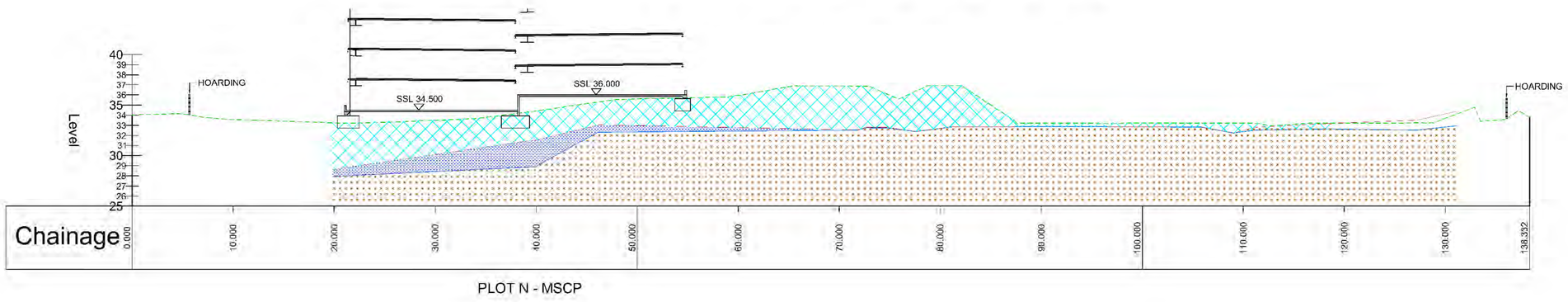
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1-1 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 25.000



2-2 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 25.000



3-3 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 25.000

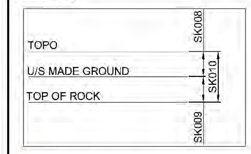
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NOTES

NB: SUBSTRATA GROUND MODEL SHOWN IS AN INTERPRETATION OF THE OVERALL RESULTS OF THE SITE INVESTIGATION AND IS SUBJECT TO REFINEMENT.

LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND



MADE GROUND - COMPRISING A PREDOMINATELY GRANULAR FILL MATRIX OF BRICK, CONCRETE, ROOF SLATE ETC WITH OTHER DELETERIOUS INCLUSIONS SUCH AS DECAYED TIMBER, ASH AND ASBESTOS FRAGMENTS.

ALLUVIUM - COMPRISING A MIXTURE OF FINE TO COARSE SAND AND GRAVEL WITH FREQUENT FINER SILT INCLUSIONS AND OCCASIONAL CLAYS. VARIABILITY IN STRATA IS AT RANDOM ACROSS THE SITE BASED ON HISTORIC FLOOD PLAIN OPERATION

WEATHERED SANDSTONE - COMPRISING A VERY DENSE FINE TO COARSE PINKING ORANGE SAND WITH FREQUENT INTACT SANDSTONE GRAVEL FRAGMENTS / INCLUSIONS.

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REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

RIBA STAGE

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W rocconsulting.com

DRAWN	DATE	SCALES
DJ	25.11.20	1:250
CHECKED	DATE	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE -DO NOT SCALE-
PW	25.11.20	
APPRVD.	DATE	EMAIL FOR DRAWINGS
PW	25.11.20	info@rocconsulting.com

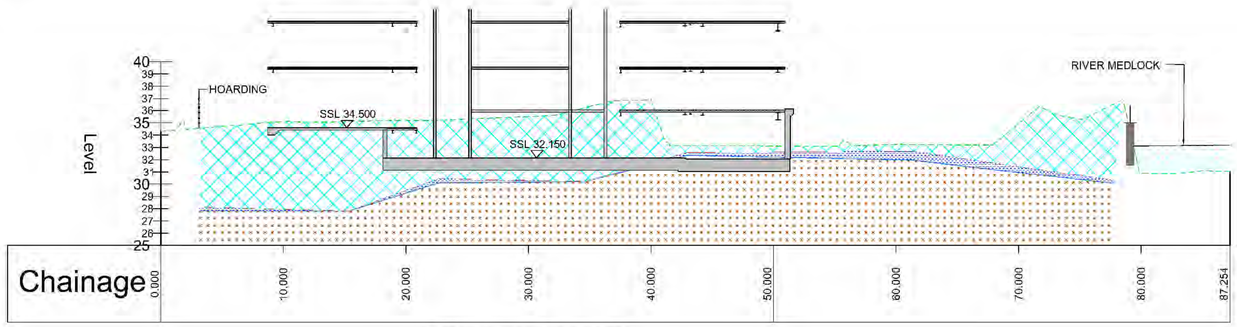
CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
PLOTS M,N & O SECTIONS SHEET 1

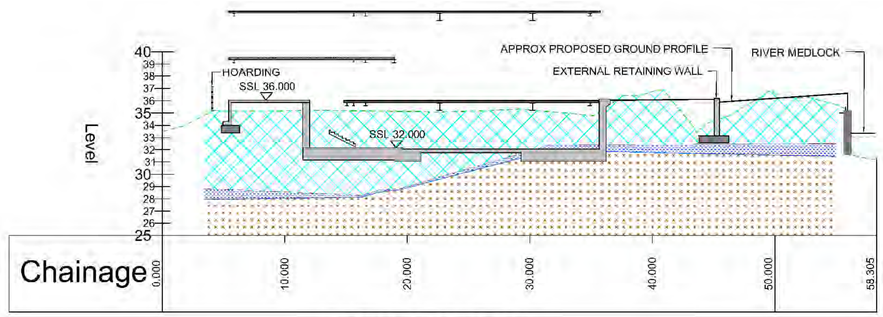
PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV
4153	ROC	XX	XX	DR	C	SK011	P1

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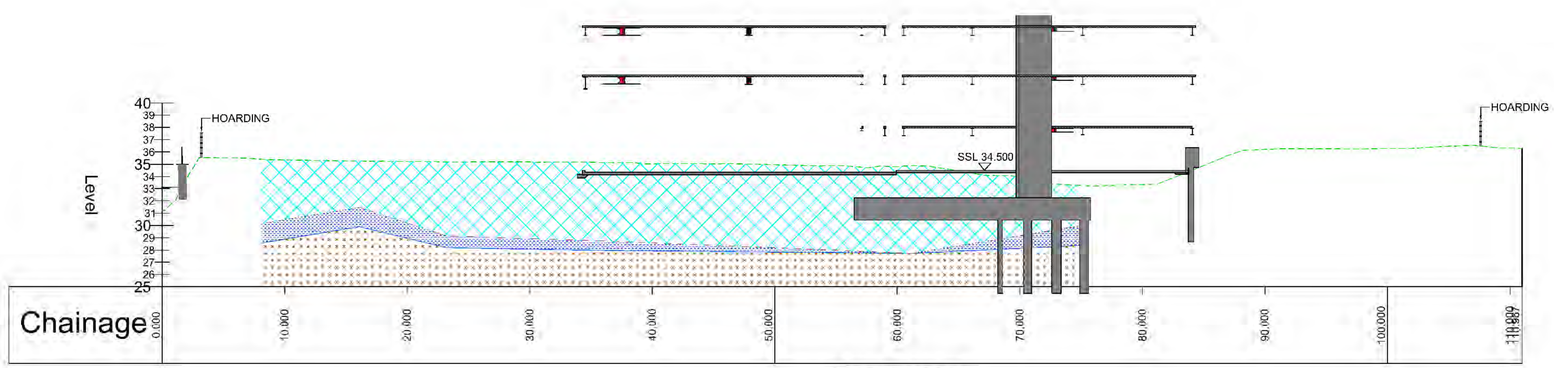
PLOT O - THE POULTON

4-4 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 25.000



PLOT O - THE POULTON

5-5 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 25.000



PLOT N - MSCP

6-6 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 25.000

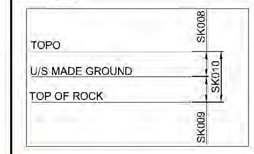
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LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND



MADE GROUND - COMPRISING A PREDOMINATELY GRANULAR FILL MATRIX OF BRICK, CONCRETE, ROOF SLATE ETC WITH OTHER DELETERIOUS INCLUSIONS SUCH AS DECAYED TIMBER, ASH AND ASBESTOS FRAGMENTS.

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REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

RIBA STAGE

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T 0161 214 5390
W rocconsulting.com

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APPRVD. PW	DATE 25.11.20	EMAIL FOR DRAWINGS info@rocconsulting.com

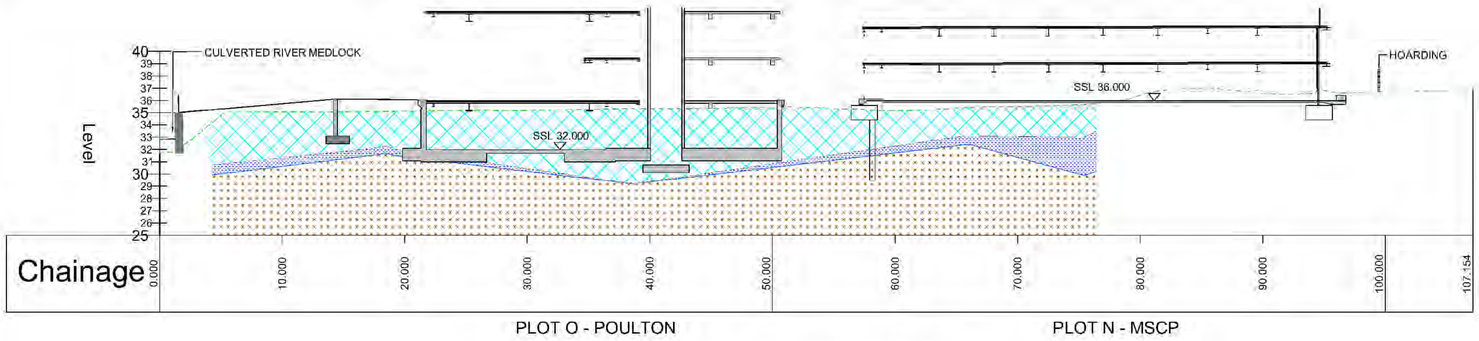
CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

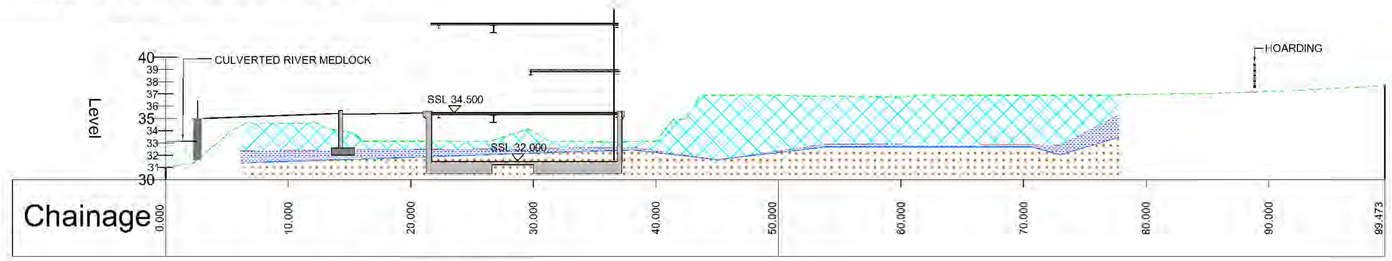
DRAWING TITLE
PLOTS M,N & O SECTIONS SHEET 2

PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV
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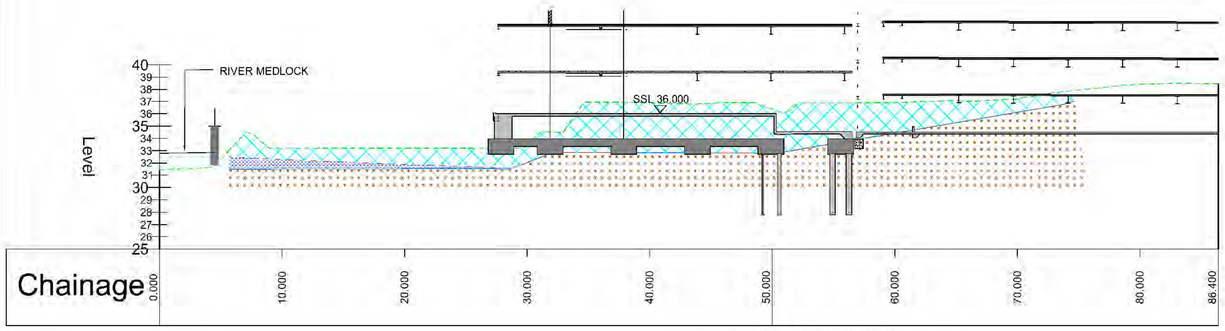
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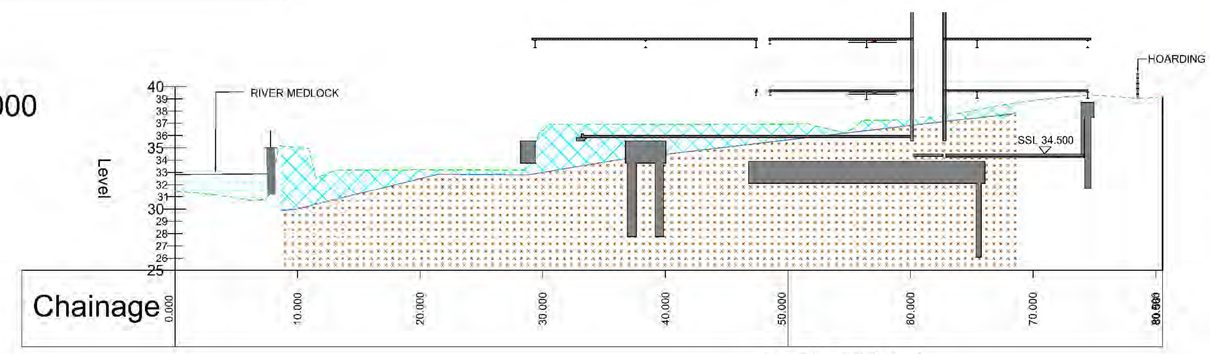
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8-8 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 30.000



9-9 - LONGSECTION
SCALE: H 1:250,V 1:250. DATUM: 25.000



10-10 - LONGSECTION
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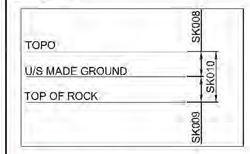
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LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND



MADE GROUND - COMPRISING A PREDOMINATELY GRANULAR FILL MATRIX OF BRICK, CONCRETE, ROOF SLATE ETC WITH OTHER DELETERIOUS INCLUSIONS SUCH AS DECAYED TIMBER, ASH AND ASBESTOS FRAGMENTS.

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REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

RIBA STAGE

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Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W rocconsulting.com

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APPRVD: PW	DATE: 25.11.20	EMAIL FOR DRAWINGS: info@rocconsulting.com

CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
PLOTS M,N & O SECTIONS SHEET 3

PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV
4153-ROC-	XX-	XX-	DR-	C-	SK013		P1

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LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND

- MAINTAINED RIVER WALL
- LEGATO BLOCK WALL

REV	DATE	DETAILS	DRN	CHK
P1	25.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

RIBA STAGE

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T 0161 214 5390
W rocconsulting.com

DRAWN DJ	DATE 25.11.20	SCALES 1:250
CHECKED PW	DATE 25.11.20	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE -DO NOT SCALE-
APPRVD. PW	DATE 25.11.20	EMAIL FOR DRAWINGS info@rocconsulting.com

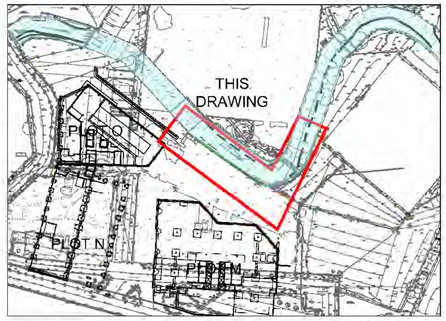
CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

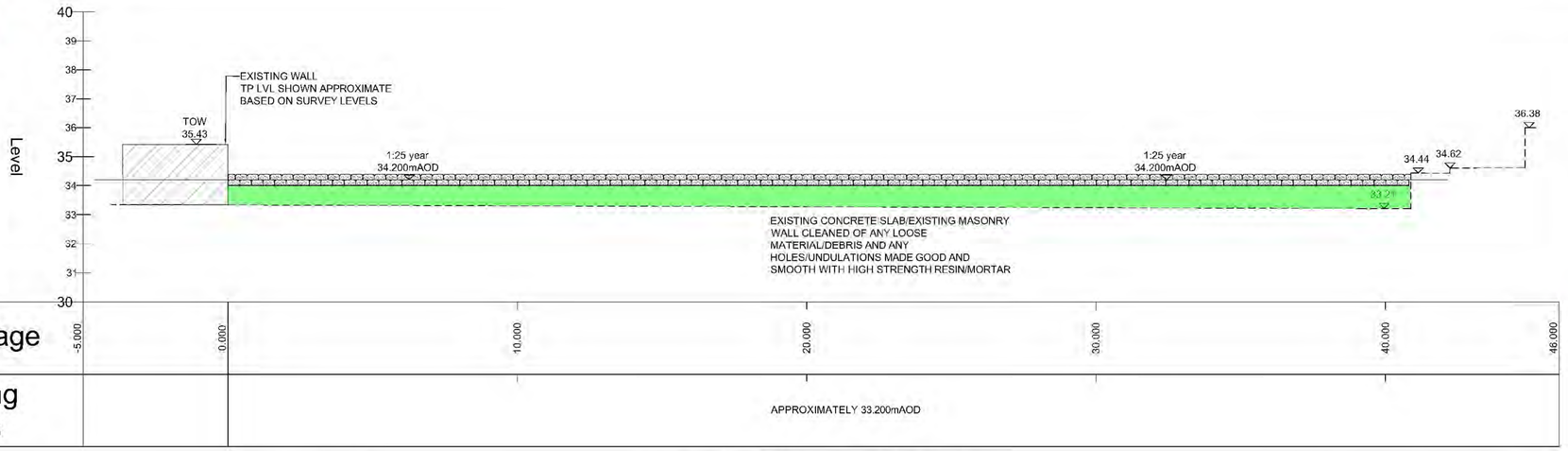
DRAWING TITLE
PLOTS M,N & O
RIVER WALL FLOOD PROTECTION PLAN

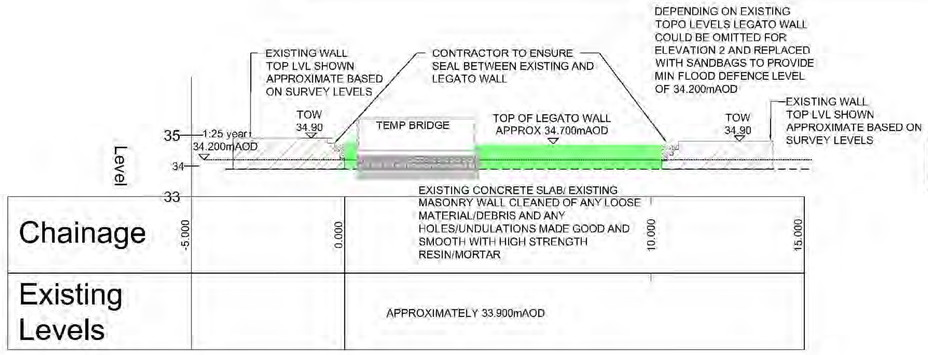
PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV
4153-ROC-XX-XX-DR-C-SK014							P1

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KEY PLAN
NTS

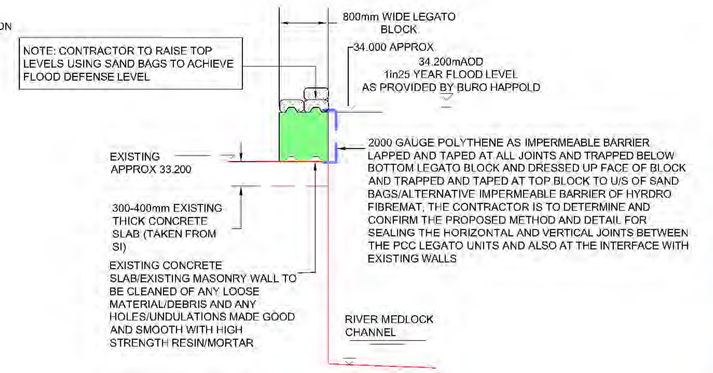




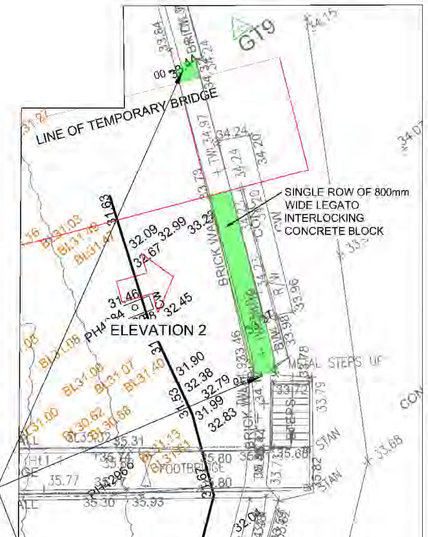
ELEVATION SIMILAR TO ELEVATION 1 EXCEPT EXISTING LEVELS INDICATE THAT TOP OF LEGATO WALL WILL BE ABOVE 1in25 YR FLOOD LEVEL OF 34.200mAD AND NO ADDITIONAL BUILD UP (SANDBAGS) WILL BE REQUIRED SUBJECT TO TOPO SURVEY LEVELS

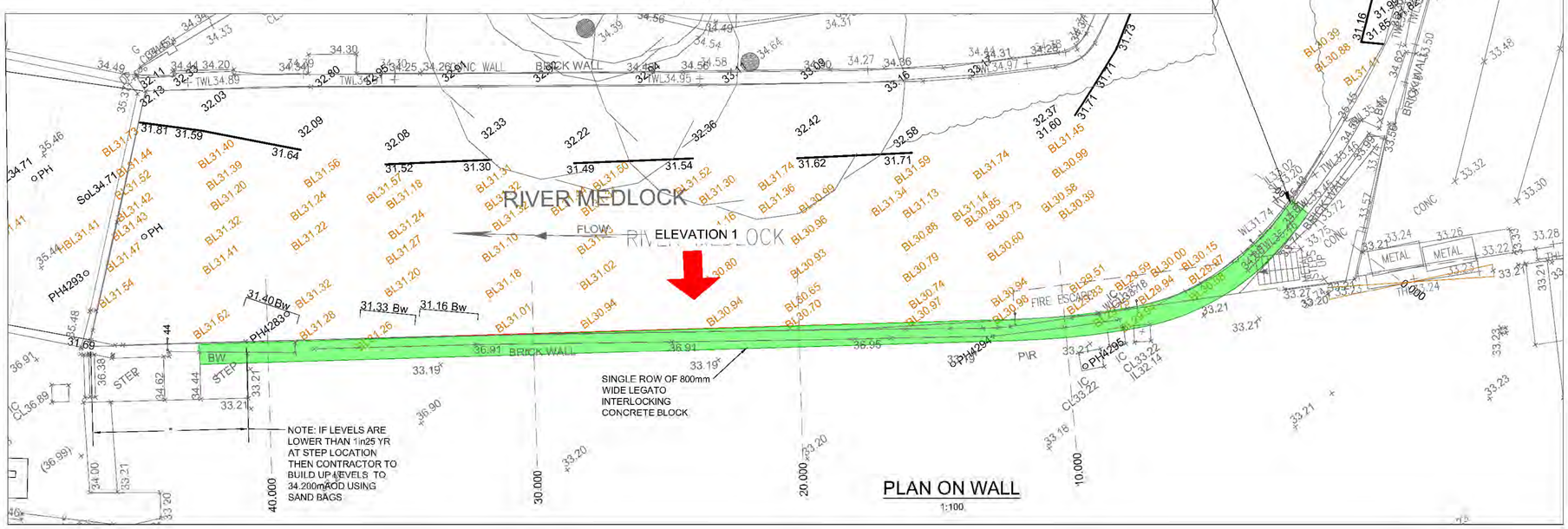
LEGATO WALL - ELEVATION 2
SCALE: H 1:100,V 1:100. DATUM: 33.000
(VIEWED FROM RIVER)

LEGATO WALL - ELEVATION 1
SCALE: H 1:100,V 1:100. DATUM: 30.000
(VIEWED FROM RIVER)



SECTION THROUGH WALL AT APPROX CHAINAGE 20 ON ELEVATION 1
SCALE 1:50





PLAN ON WALL
1:100

NOTES

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LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

FLOOD LEVEL DATA PROVIDED BY BURO HAPPOLD

LEGEND

FLOOD DEFENCE BARRIER WALL

NB: AS FLOOD BARRIER DEFENCE IS WITHIN 8m OF RIVER, E.A CONSENT (VIA BURO HAPPOLD) IS REQUIRED PRIOR TO COMMENCEMENT OF WORKS

NB: THE FLOOD DEFENSE SHOWN ON THIS DRAWING ARE FOR TEMPORARY FLOOD BARRIER STAGE 1 WORKS TO DEFEND AGAINST 1IN25 YEAR FLOOD EVENTS

REV	DATE	DETAILS	DRN	CHK
P3	07.12.20	Flood levels updated	DJ	PW
P2	03.12.20	Amended to suit 1in25 year defence	DJ	PW
P1	30.11.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

RIBA STAGE

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DRAWN DJ	DATE 30.11.20	SCALES 1:100 1:50
CHECKED PW	DATE 30.11.20	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE –DO NOT SCALE–
APPRVD. PW	DATE 30.11.20	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
RIVER MEDLOCK FLOOD DEFENCE WALL STAGE 1 1in25 YEAR

PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV.
4153	ROC	XX	XX	DR	C	SK015	P3

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NOTES

NB: SUBSTRATA GROUND MODEL SHOWN IS AN INTERPRETATION OF THE OVERALL RESULTS OF THE SITE INVESTIGATION AND IS SUBJECT TO REFINEMENT.

LEVELS BASED ON SURVEY OPS SURVEY 20H044_U SUBJECT TO VALIDATION AND AMALGAMATION

LEGEND

- FORMATION LEVEL
- TOP/BOTTOM OF BANKS

34.6mAOD 1in100 FLOOD

34.8mAOD 1in100 FLOOD
34.20mAOD 1in25 FLOOD

NOTE: BATTERS TO START 1m INSIDE HOARDING LINE AS SHOWN

FORMATION LEVEL 32.000mAOD

FORMATION LEVEL 34.500mAOD

FORMATION LEVEL 36.000mAOD

FORMATION LEVELS 36.000mAOD

1:3

NOTE: BATTERS TO START 1m INSIDE HOARDING LINE AS SHOWN

NOTE: BATTERS TO START 1m INSIDE HOARDING LINE AS SHOWN

REV	DATE	DETAILS	DRN.	CHK.
P1	07.12.20	Issued For Comment	DJ	PW

DRAWING STATUS
FOR COMMENT

RIBA STAGE

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DRAWN DJ	DATE 07.12.20	SCALES 1:250
CHECKED PW	DATE 07.12.20	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE –DO NOT SCALE–
APPRVD. PW	DATE 07.12.20	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
MAYFIELD PARTNERSHIP LTD

PROJECT TITLE
MAYFIELD PARK

DRAWING TITLE
PLOTS M,N AND O FORMATION LEVELS

PROJECT	ORIGIN	ZONE	LVL	TYPE	ROLE	No.	REV
4153-ROC-XX-XX-DR-C-SK016							P1

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RoC CONSULTING

Groundwork Specification Excavating & Filling

Mayfield Enabling Works

for

Mayfield Partnership Ltd

November 2020



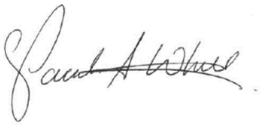
COMPLEX CHALLENGES ...
MADE SIMPLE

Groundwork Specification
Excavating & Filling

Mayfield Enabling Works

for

Mayfield Partnership ltd

TITLE	NAME	SIGNATURE	DATE
Report Author	ANDY JAMES		**25/1120**
Director	PAUL WHITE		**25/11/20**
Revisions			
Report Reference	4153-ROC-XX-XX-SP-C-D20		
Report Status	**DRAFT**		

COMPLEX CHALLENGES ...
MADE SIMPLE

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APPENDIX 6/3 **REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION**

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WATERCOURSES INCLUDING, DITCHES

EMBANKMENT CONSTRUCTION

COMPACTION

BENCHING OR SHAPING OF EARTHWORKS SLOPE FACES TO RECEIVE FILL

D20 Excavating and filling

To be read with Preliminaries/General conditions

GENERALLY/THE SITE

110 SITE INVESTIGATION
- Report: Refer to RoC Consulting Site Investigation Report.

145 VARIATIONS IN GROUND WATER LEVEL
- Give notice: If levels encountered are significantly different from levels in the site investigation report or previously measured.

CLEARANCE/EXCAVATING

170 REMOVING SMALL TREES, SHRUBS, HEDGES AND ROOTS
- Identification: Clearly mark trees to be removed.
- Small trees, shrubs and hedges: Cut down
- Roots: Grub up and dispose of without undue disturbance of soil and adjacent areas
- Safety: Comply with HSE/ Arboriculture and Forestry Advisory Group safety leaflets.

175 FELLING LARGE TREES
- Definition: Girth over 600 mm.
- Identification: Clearly mark trees to be removed.
- Safety: Comply with HSE/ Arboriculture and Forestry Advisory Group safety leaflets.
- Felling: As close to the ground as possible.
- Stumps: .
- Work near retained trees: Take down trees carefully in small sections to avoid damage to adjacent trees that are to be retained, where tree canopies overlap and in confined spaces generally.

220 STRIPPING TOPSOIL
- General: Before beginning general excavation or filling, strip topsoil from areas where there will be regrading, buildings, pavings/ roads and other areas shown on drawings.
- Depth:
  - Remove to an average depth of 300mm.
  - Give notice where the depth of topsoil is difficult to determine.
- Handling: Handle topsoil for reuse or sale in accordance with clause 225.
- Around trees: Do not remove topsoil from below the spread of trees to be retained.
- Site storage: .

221 TREATING TOPSOIL
- Treatment: Apply a suitable translocated nonresidual herbicide.
- Timing: Not less than two weeks before excavating topsoil.

225 HANDLING TOPSOIL
- Standard: To BS 3882.
- Aggressive weeds:
  - Species: Included in the Weeds Act, section 2 or the appropriate Wildlife and Countryside Act for the relevant jurisdiction.
  - Give notice: Obtain instructions before moving topsoil.
- Contamination: Do not mix topsoil with:
  - Subsoil, stone, hardcore, rubbish or material from demolition work.
  - Other soil or material containing aggressive weeds, sharps, plastics and non-soil forming materials and notifiable animal or plant diseases.

- Oil, fuel, cement or other substances harmful to plant growth.
- Other classifications of topsoil.

• Multiple handling: Keep to a minimum. Use topsoil immediately after stripping.

240 ADJACENT EXCAVATIONS

• Requirement: Where an excavation encroaches below a line drawn at an angle from the nearest formation level of another higher excavation, the lower excavation, all work within it and backfilling thereto, must be completed before the higher excavation is made.
• Angle of line below horizontal: 45°.
• Backfill material: Hardcore filling as clause 710.

244 EXCAVATIONS ADJACENT TO EXISTING FOUNDATIONS

• Prior to commencing excavation:
  - Excavate trial pits adjacent to existing foundations to determine extent and formation levels.
  - Allow for inspection of trial pits.
  - Allow time for amendment of details if required.
    Time period: .
• Backfill material to new excavation: .

250 PERMISSIBLE DEVIATIONS FROM FORMATION LEVELS

• Beneath mass concrete foundations: ±25 mm.
• Beneath ground bearing slabs and r.c. foundations: ±15 mm.
• Embankments and cuttings: ±50 mm.
• Ground abutting external walls: ±50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

310 UNSTABLE GROUND

• Generally: Ensure that the excavation remains stable at all times.
• Give notice: Without delay if any newly excavated faces are too unstable to allow earthwork support to be inserted.
• Take action: If instability is likely to affect adjacent structures or roadways, take appropriate emergency action.

320 RECORDED FEATURES

• Recorded foundations, beds, drains, manholes, etc: Break out and seal drain ends.
• Contaminated earth: Remove and disinfect as required by local authority.

330 UNRECORDED FEATURES

• Give notice: If unrecorded foundations, beds, voids, basements, filling, tanks, pipes, cables, drains, manholes, watercourses, ditches, etc. not shown on the drawings are encountered.

335 NEW FOUNDATIONS CROSSING OLD FOUNDATIONS OR WALLS

• Break out: The old foundation/ wall where it crosses the new foundation/ wall:
  - Length of breaking out: Width of the new foundation/ wall plus 50 mm on either side of new foundation.
  - Depth of breaking out: As necessary to permit the construction of the new foundation to its design cross section.
• Disturbed/ softened soil: When the formation for the old foundation/ wall is deeper than the formation of the new foundation.
  - Excavate: Soil that has been disturbed and/ or softened on either side of the old wall/ foundation, and for 100 mm into undisturbed ground on either side.
• Step up: The formation for the new foundation as necessary on either side of the old foundation/ wall until the formation is at its design level.
  - Size of steps: Minimum distance between steps 600 mm and maximum height of step

225 mm.
- Backfilling beneath design formation level: Lean mix concrete.

360 EXCESS EXCAVATION
- Excavation taken wider than required:
  - Backfill: Using selected site won material compacted in 300mm maximum layers or lean mix concrete.
  - Excavation taken deeper than required:
    Backfill: With well graded granular material or lean mix concrete

370 UNDERGROUND STRUCTURES IN LANDSCAPE AREAS
- Generally: Remove walls, roads, foundations, disused services, drains, manholes and the like to minimum depth.
- Minimum depth below finished levels:
  - Grass, ground cover and perennial planting: 500 mm.
  - Shrub planting: 750 mm.
  - Within 2 m of tree planting: 1000 mm.
- Walls and slabs remaining: In every 10 m² of wall or slab, make a drainage hole at least 600 mm diameter.

DISPOSAL OF MATERIALS

410 EXCAVATED TOPSOIL STORAGE
- Storage: Stockpile in temporary storage heaps.

415 EXCAVATED TOPSOIL REMOVAL
- General: Remove from site.

420 TOPSOIL STORAGE HEAPS
- Location: .
- Standard: To BS 3882.
- Height (maximum): .
- Protection:
  - Do not place any other material on top of storage heaps.
  - Do not allow construction plant to pass over storage heaps.
    Prevent compaction and contamination.

421 TOPSOIL STORAGE HEAP TREATMENT
- Treatment: .

441 SURPLUS SUBSOIL
- Excavated material: Stockpile in temporary storage heaps.
- Retained material: Spread and level surplus subsoil on site.
  - Locations: .
  - Protected areas: Do not raise soil level within root spread of trees that are to be retained.
- Remaining material: Remove from site.

450 WATER
- Generally: Keep all excavations free from water until:
  - Formations are covered.
  - Below ground constructions are completed.
  - Basement structures and retaining walls are able to resist leakage, water pressure and flotation.
- Drainage: Form surfaces of excavations and fill to provide adequate falls.
- Removal of water: Provide temporary drains, sumps and pumping as necessary. Do not pollute watercourses with silt laden water.

454 GROUND WATER LEVEL, SPRING OR RUNNING WATER

- Give notice: If it is considered that the excavations are below the water table.
- Springs/ Running water: Give notice immediately if encountered.

457 PUMPING

- General: Do not disturb excavated faces or stability of adjacent ground or structures.
- Pumped water: Discharge without flooding the site or adjoining property.
- Sumps: Construct clear of excavations. Fill on completion.
  Locations: .

FILLING

500 PROPOSED FILL MATERIALS

- Details: Submit full details of proposed fill materials to demonstrate compliance with specification, including:
  - Type and source of imported fill.
  - Proposals for processing and reuse of material excavated on site.
  - Test reports as required elsewhere.
- Timing: At least 21 days before starting filling.

510 HAZARDOUS, AGGRESSIVE OR UNSTABLE MATERIALS

- General: Do not use fill materials which would, either in themselves or in combination with other materials or ground water, give rise to a health hazard, damage to building structures or instability in the filling, including material that is:
  - Frozen or containing ice.
  - Organic.
  - Contaminated or noxious.
  - Susceptible to spontaneous combustion.
  - Likely to erode or decay and cause voids.
  - With excessive moisture content, slurry, mud or from marshes or bogs.
  - Clay of liquid limit exceeding 80 and/or plasticity index exceeding 55.
  - Unacceptable, class U2 as defined in the Highways Agency 'Specification for highway works', clause 601.

520 FROST SUSCEPTIBILITY

- General: Except as allowed below, fill must be non-frost-susceptible as defined in Highways Agency 'Specification for Highway Works', clause 801.8.
- Test reports: If the following fill materials are proposed, submit a laboratory report confirming they are non-frost- susceptible:
  - Fine grained soil with a plasticity index less than 20%.
  - Coarse grained soil or crushed granite with more than 10% retained on a 0.063 mm sieve.
  - Crushed chalk.
  - Crushed limestone fill with average saturation moisture content in excess of 3%.
  - Burnt colliery shale.
- Frost-susceptible fill: May only be used:
  - At depths below the finished ground surface greater than: 600 mm.
  - Within the external walls of buildings below spaces that will be heated. Protect from frost during construction.
    Where frost heave will not affect structural elements.

525 TESTING OF SUITABILITY OF FILL MATERIALS BEFORE START OF FILLING

- Laboratory: UKAS/ NAMAS accredited laboratory.
- Submit report to: Structural engineer (two copies).
  - Timing: 21 days before starting filling.

- Samples: Deliver to laboratory as required.
  - Additional requirements: Also deliver 25 kg samples to offices of structural engineer. On request, collect and dispose.
- Tests: As directed.
- Frequency: Submit with tender proposed rate and frequency of testing to demonstrate continuing compliance of imported or reprocessed fill with specified properties.

530 PLACING FILL

- Surfaces of excavations and areas to be filled: Free from loose soil, topsoil, organic material, rubbish and standing water.
- Freezing conditions: Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.
- Adjacent structures, membranes and buried services:
  - Do not overload, destabilise or damage.
  - Submit proposals for temporary support necessary to ensure stability during filling.
  - Allow 14 days (minimum) before backfilling against in situ concrete structures.
- Layers: Place so that only one type of material occurs in each layer.
- Earthmoving equipment: Vary route to avoid rutting.

535 COMPACTION GENERALLY

- General: Compact fill not specified to be left loose as soon as possible after placing.
- After compaction: Surface of each layer must be well closed, showing no movement under compaction plant, and without cracks, holes, ridges, loose material and the like.
- Defective areas: Remove and recompact to full thickness of layer using new material.

540 BENCHING IN FILL

- Adjacent areas: If, during filling the difference in level between adjacent areas of filling exceeds 600 mm, cut into edge of higher filling to form benches 600 mm minimum width and height equivalent to depth of a layer of compacted filling.
- New filling: Spread and compact to ensure maximum continuity with previous filling.

610 COMPACTED FILLING FOR LANDSCAPE AREAS

- Fill: Material capable of compaction by light earthmoving plant.
- Filling: Layers not more than 200 mm thick. Lightly compact each layer to produce a stable soil structure.

615 LOOSE TIP FILLING FOR LANDSCAPE AREAS

- Filling: Do not firm, consolidate or compact when laying. Tip and grade to approximate levels in one operation with minimum of trafficking by plant.

617 HIGHWAYS AGENCY TYPE 1 UNBOUND MIXTURE

- Fill: To Highways Agency 'Specification for highway works', clauses 801 and 803:
  - Crushed rock (other than argillaceous rock).
  - Crushed concrete.
  - Recycled aggregates.
  - Crushed non-expansive slag.
  - Well-burned non-plastic colliery shale.
- Amendments to requirements in Highways Agency 'Specification for highway works': None.
- Filling: To Highways Agency 'Specification for highway works', clause 802.

618 HIGHWAYS AGENCY TYPE 2 UNBOUND MIXTURE

- Fill: To Highways Agency 'Specification for highway works', clauses 801 and 804:
  - Crushed rock (other than argillaceous rock).
  - Crushed concrete.
  - Crushed non-expansive slag.
  - Well-burned non-plastic colliery shale.

- Natural gravel.
- Natural sand.

- Amendments to requirements in Highways Agency 'Specification for highway works': None.
- Filling: To Highways Agency 'Specification for highway works', clause 802.

620 SUBGRADE IMPROVEMENT LAYER (CAPPING)

- Fill: To Highways Agency 'Specification for highway works', Table 6/1, Class 6F1 or 6F2.
- Filling: Place and compact to Highways Agency Specification for highway works, Table 6/1, clause 612 and clause 613.3, 613.9 and 613.10.

626 COMPACTED GENERAL FILL

- Suitable material: .
- Excavated material: Select suitable material and keep separate.
- Filling: Spread and level material in layers. As soon as possible thoroughly compact each layer.
- Required compaction: .
- Proposals: Well in advance of starting work submit details of proposed:
  - Materials to be used, including quantities of each type.
  - Type of plant.
  - Maximum depth of each compacted layer.

  Minimum number of passes per layer.

650 PROTECTION OF COMPACTED FILLING

- Temporary protective filling: Before allowing construction traffic, raise level of compacted cohesive soil filling at least 150 mm above formation level using properly compacted temporary filling.
- Removal: Remove temporary protective filling from site before permanent construction.

700 BACKFILLING AROUND FOUNDATIONS

- Under oversite concrete and pavings: Hardcore as clause 710.
- Under grassed or soil areas: Material excavated from the trench, laid and compacted in 300 mm maximum layers.

710 HARDCORE FILLING

- Fill: Granular material, free from excessive dust, well graded, all pieces less than 75 mm in any direction:
  - Test requirements:

  Minimum 10% fines value tested in a soaked condition to BS 812-111 Not required.
  Impact value SZ tested to BS EN 1097-2 Not required.
- In any one layer only one of the following:
  - Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
  - Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
  - Crushed non-expansive slag.
  - Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
  - Well-burned non-plastic colliery shale.
  - Natural gravel.
  - Natural sand.
- Filling: Spread and level in 150 mm maximum layers. Thoroughly compact each layer.

730 BLINDING

- Surfaces to receive sheet overlays or concrete:

  Blind with:
  - Concrete where shown on drawings; or
  - Sand, fine gravel, or other approved fine material applied to fill interstices. Moisten as

necessary before final rolling to provide a flat, closed, smooth surface.
- Sand for blinding: To BS EN 12620, grade 0/4 or 0/2 (MP).
- Permissible deviations on surface level: +0 -25 mm.

HIGHWAYS AGENCY EARTHWORKS SPECIFICATION APPENDICES

850 COMPACTED GENERAL FILLING/ EARTHWORKS
- Specification: Highways Agency 'Specification for highway works', Earthworks section, clauses .
  - Appendices (see clauses 900-970 in this section): .
  - Amendments to requirements in Highways Agency 'Specification for highway works': .
- Definition: References to the 'Overseeing Organisation' are deemed to be to the issuer of this specification.
- Fill material:
  - Permitted classes/ source: .
  - Assessment of acceptability: Tests as table 6/1 carried out by .
  - Preliminary tests: .
- Compaction: As table 6/4.

900 APPENDIX 6/1 - REQUIREMENTS FOR ACCEPTABILITY AND TESTING, ETC. OF EARTHWORKS MATERIALS
- .`

905 APPENDIX 6/2 - REQUIREMENTS FOR DEALING WITH CLASS U1B AND U2 UNACCEPTABLE MATERIAL
- .

910 APPENDIX 6/3 - REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)
- .

~~915 APPENDIX 6/4 - REQUIREMENTS FOR CLASS 3 MATERIAL~~
- .

~~920 APPENDIX 6/5 - GEOTEXTILES USED TO SEPARATE EARTHWORKS MATERIALS~~
- .

~~925 APPENDIX 6/6 - FILL TO STRUCTURES AND FILL ABOVE STRUCTURAL FOUNDATIONS~~
- .

~~930 APPENDIX 6/7- SUB-FORMATION AND CAPPING AND PREPARATION AND SURFACE TREATMENT OF FORMATION~~
- .

~~935 APPENDIX 6/8 - TOPSOILING~~
- .

~~940 APPENDIX 6/9 - EARTHWORK ENVIRONMENTAL BUNDS, LANDSCAPE AREAS, STRENGTHENED EMBANKMENTS~~
- .

~~945 APPENDIX 6/10 - GROUND ANCHORAGES, CRIB WALLING AND GABIONS~~
- .

~~950 APPENDIX 6/11 - SWALLOW HOLES AND OTHER NATURALLY OCCURRING CAVITIES~~

~~AND DISUSED MINE WORKINGS~~

- .

~~955 APPENDIX 6/12 - INSTRUMENTATION AND MONITORING~~

- .

~~960 APPENDIX 6/13 - GROUND IMPROVEMENT~~

- .

965 APPENDIX 6/14 - LIMITING VALUES FOR POLLUTION OF CONTROLLED WATERS

- .

970 APPENDIX 6/15 - LIMITING VALUES FOR HARM TO HUMAN HEALTH AND THE ENVIRONMENT

-

Appendix 1/5

Testing to be Carried out by the Contractor

Unless otherwise stated the **Contractor** shall carry out all sampling and testing in this Appendix.
(N) indicates that testing shall be undertaken by a UKAS accredited laboratory for that particular material unless otherwise agreed with the **Project Manager**.
Unless otherwise shown in this Appendix, tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
Unless specifically mentioned to the contrary all samples used in the testing shall be taken from materials after delivery to the site for incorporation into the permanent works.
The tests scheduled in this Appendix shall only apply to those works, goods or materials required under the contract.

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
Clause 601, 631 to 637, 640	For each area of cutting	Classification of earthworks material	Each different type of material excavated		
	On carriageway earthworks Formation incl 6T material	Determination of vertical deflection and strength characteristics by Plate Loading test	1 every 20m and 1 per 200sqm of carriageway or change in material	Required BS1377 (1990) part 9	As instructed on site by the Project Manager. Certificate to include insitu CBR determined from Plate Load Tests results
Clause 601, 631 to 637, 640	**Class** Site Won General granular fill		Once per week. 2 per 500 tonnes 2 per 500tonnes max 5/day	Required (BS1377) (632)	Tests to be conducted at point of excavation
	1	Grading (N)	One per 1000m^3	(BS1377)	Test results to be supplied to the Designer 3 working days prior to the date proposed for fill placement. Test results will be used to determine the limits in Appendix 6/1 Tab 6/1.
		Uniformity coefficient		(SHW) (BS1377)	
		Optimum Moisture Content (N)	N/A		
		Moisture Content (N)	One per 500m^3		
		Contamination testing suite - soils - Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc) - Speciated PAH - TPH – 6 banded - if contamination is encountered then TPHCWG should be undertaken. - pH	1 per 500m3		Testing as part of the environmental controls on earthwork operations

		Contamination testing suite - Leachate analysis - Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc) - Speciated PAH - TPH – 6 banded - pH		3 per source		To ensure that there is not a risk to controlled waters. This should be via the BS EN 12457 method
		1C only	Resistance to fragmentation	Weekly		
			Los Angeles coefficient	3 per source	(Cl635)	
	2	Site Won General cohesive fill	Grading (N)	1 per 2000m^3		Test results to be supplied to the Designer 3 working days prior to the fill being placed. Test results will be used to determine the limits in Appendix 6/1 Tab 6/1. Quality control testing of materials.
			Moisture content / Plastic Limit (N)	1 per 500m3		
			Optimum Moisture Content (N)	1 per 2000m3		
			MCV	1 per 500m3		
			TRL 447 Test Nos. 1 and 2 (N)	1 per 1000m3 (minimum 6 per source)		
			Contamination testing suite - soils - Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc) - Speciated PAH - TPH – 6 banded - if contamination is encountered then TPHCWG should be undertaken. - pH	1 per 500m3		Testing as part of the environmental controls on earthwork operations
			Contamination testing suite - Leachate analysis - Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc) - Speciated PAH - TPH – 6 banded - pH	3 per source		To ensure that there is not a risk to controlled waters. This should be via the BS EN 12457 method
	4	Landscape fill	Grading (N)	Daily 1 per 2000m3 per source		
			Moisture Content (N)	Daily 1 per 2000m3 per source		
			MCV	Daily 1 per 2000m3 per source		
	5	Topsoil	Grading (N)	Daily per source		
	6	Selected granular fill	Grading / uniformity coefficient (N)	1 per 1000m3		Class 6C testing shall exclude: Plasticity Index, Optimum Moisture Content; Moisture Content;

			Plasticity Index (N)	6 per source		
			Los Angeles coefficient	3 per source		
			Optimum Moisture Content (N)	1 per 1000m3		
			Moisture / Water Content (N)	1 per 1000m3		
			Organic matter / water soluble sulphate content / oxidisable sulfides (OS) content (N)	Source approval plus 1 per 1000m3		
			pH/chloride ion content (N)			
602	Earthworks material beneath roads or paved central reserve (i) offsite source (ii) onsite source		Frost Heave (N)	3 per source 1 per 5000m3		
609, 621	Geotextiles		Tensile load	Current BBA Certificate for each geotextile in Lieu of testing frequency of 1 per 500m2		Reference shall be made to Appendix 6/9, Clause 19.3.3(v)
			Pore size			
			Permeability			
612	Compaction of Fills					
		Method Compaction	Field Dry Density Test	1 per 1000m3		Not more than 2 no. compaction layers shall be placed and compacted prior to carrying out field dry density tests at the required frequency.
		End Product	Undrained Shear Strength of remoulded material (Class 2 material)	1 per 250m3		
			OMC (2.5kg rammer/vibrating hammer method)	One per source		
			Field Dry density	1 per 1000m3		
618	Top soiling and grass seeding		Rate of spread of fertiliser	1 per 1000m2		
			Rate of spread of seeding			
			Chemical analysis of fertiliser	1 per source		
			Grass seed germination and purity (Manufacturer's test)	1 per source and mix variety	Required prior to sowing	
639	Drainage layers		Grading	1 per 1000m2		
642	Earthworks materials adjacent to structures		Constrained soil modulus (M)	3 on each side of each structure		

Appendix 6/1

Requirements for Acceptability and Testing of Earthworks Materials

Acceptable Limits for Fills

1. Acceptability testing is to be the responsibility of the Contractor and be carried out in accordance with Specification Appendix 6/1 and at the frequencies given in Appendix 1/5 in a UKAS accredited testing laboratory where required.

2. Earthworks materials are to comply with the 600 series of the Highways Agency 'The Manual of Contract Documents for Highway Works (SHW)' and with the particular requirements of this appendix.

3. A schedule of acceptability limits for the fill materials required for this contract is given in Appendix Table 6/1 following this Appendix. Unless described in this Appendix, other acceptability limits are shown in Tables 6/1 and 6/3 of SHW.

4. Unless described in this Appendix, the grading requirements for each class of fill are given in Table 6/2 in the SHW Series 600.

5. The compaction requirements are given in Table 6/4 SHW Series 600.

6. Where a material class is not shown on the Appendix Table 1 below, reference should be made to the SHW.

7. Where no test is required, this is indicated by NR.

8. The Contractor shall carry out the relevant classification and acceptability tests on each class of material to be used in the earthworks.

9. The Contractor shall submit two copies of all classification test results to the Designer within two working days of the completion of the test. The copies shall be signed by the Contractor's responsible engineer or technician.

10. The Contractor shall submit his classification of the materials in areas of excavation and import source to the Designer before the start of excavation or importation.

11. Final classification may be made after deposition. Where the Contractor is of the opinion that the classification of the site materials has changed, there may be a requirement to carry out new classification tests to check acceptability

12. Class 4 landscape material: The material used for Class 4 will be able to be transported and placed and be stable in its design profile. All acceptable materials excavated on site may be used as Landscape Fill, Class 4 as defined in Table 6/1. The Designer may impose restrictions on types of material or acceptability limits where necessary to ensure stability of the Works. Class U2 materials as defined in the Specification may not be used as Landscape Fill. The compaction shall be sufficient to construct landscaping in accordance with the Landscaping Design and to avoid subsequent excessive settlement (in the context of the required end use). The Contractor shall use appropriate plant to avoid over-compaction and maintain stability while working.

Requirements for Determining Acceptability

1. Where source approval of imported material is shown, the testing is to be the responsibility of the Contractor and be carried out in accordance with Specification Appendix 1/5 and 6/1. Source approval will comprise (as a minimum) 3 sets of the relevant test on each sub-unit of material to be used in the Contract.

2. The Contractor is to maintain full records on each sub-unit of imported materials including but not limited to, the location of the sources, the supplier's details the acceptability testing and the location it has been incorporated within the Permanent Works.

3. The preliminary classification of the earthwork's materials shall be carried out by the Contractor generally at the point of excavation for on-site materials and at each point of deposition for imported materials. The location of trial pits for classification work shall be determined by the Contractor and copied to the Designer for information.

4. Where the properties of the materials are suspected to have changed between excavation or deposition, or the material undergoes significant deterioration during compaction, further testing and sampling will be carried out at the point of deposition. The Designer shall be informed of any change in classification of earthworks materials.

5. The Contractor is to make all test result summaries available electronically for viewing, filtering/querying and print out on an open access database.

6. Where a nuclear density gauge is employed to monitor in situ or compacted density, dry density or moisture content, the gauge shall have been calibrated within the previous seven days, and the measurement shall have been calibrated against other measures of the required properties obtained by other tests,

7. The MCV test shall be used for control of acceptability of cohesive fill following calibration with undrained shear strength tests and dry density/moisture content relationship tests. Further site calibration tests should be carried out if the MCV relationship is considered to have changed.

8. The hand shear vane test shall only be used as an alternative to Clause 633 (triaxial test) when suitable calibration tests are undertaken

Designation (if required) of Material as Class 3

1. Class 3 material (chalk) is not expected to be excavated during the construction works. It is not expected that any chalk material will be imported.

Requirements for Removal off site of Excavated Acceptable Material or Unacceptable Material Requiring Processing or Retention of Surplus Material

1. No material is to be removed off site without the agreement of the appropriate regulatory authority.

2. Surplus material is to be temporarily stockpiled in areas designated for spoil storage. The earthworks design of the temporary stockpile is the responsibility of the Contractor.

Permitted use of Acceptable Material or Unacceptable Material Required to be Processed for Purposes other than General Fill

1. Processing of such material for re-use other than for general fill is not envisaged.

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Table 6/1A Acceptable Earthworks Materials

Classification and Compaction Requirements

Table 6/1A: Acceptable Earthworks Materials: Classification and Compaction Requirements								
Soil 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**
				PROPERTY (See exceptions in previous column)	**Defined and tested in accordance with:**	**Acceptable limits within:-**		
						LOWER	**UPPER**	
1A	Well graded granular material	General Fill	Any material or combination of materials other than material designated as Class 3 in the Contract. Recycled aggregate.	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	SHW Tab 6/4 Method 2
				Uniformity coefficient	See Note 5	10	-	
				Moisture content	BS 1377: Part 2	OMC-2%	OMC+2%	
1B	Uniformly graded granular material	General Fill	Any material or combination of materials other than chalk. Recycled aggregate.	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	SHW Tab 6/4 Method 3
				Uniformity coefficient	See Note 5	-	10	
				Moisture content	BS 1377: Part 2	OMC-2%	OMC+2%	
1C	Coarse granular material	General Fill	Any material or combination of materials other than material designated as Class 3 in the Contract. Recycled aggregate.	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	SHW Tab 6/4 Method 5
				Uniformity coefficient	See Note 5	5	-	
				Los Angeles coefficient	Clause 635	-	50	
2A	Wet cohesive material	General Fill	Any material or combination of materials other chalk.	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	SHW Tab 6/4 Method 1 (using deadweight tamping or vibratory tamping rollers or grid rollers if material Liquid Limit >50%).
				Plastic Limit (PL)	BS 1377: Part 2	-	-	
				Moisture Content	BS 1377: Part 2	PL-4	-	

				MCV	Clause 632	9	16	
				Undrained Shear Strength of remoulded Material	Clause 633	50	200	
2B	Dry cohesive material	General Fill	Any material or combination of materials other chalk.	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	SHW Tab 6/4 Method 2.
				Plastic Limit (PL)	BS 1377: Part 2	-	-	
				Moisture content	BS 1377: Part 2	-	PL – 4%	
				MCV	Clause 632	6.5	16	
				Undrained Shear Strength of remoulded Material	Clause 633	50	200	
2C	Stony cohesive material	General Fill	Any material or combination of materials other chalk.	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	SHW Tab 6/4 Method 2.
				Plastic Limit (PL)	BS 1377: Part 2	-	-	
				Moisture content	BS 1377: Part 2	NR	NR	
				MCV	Clause 632	6.5	16	
				Undrained Shear Strength of remoulded Material	Clause 633	50	200	
6C	Selected uniformly graded granular material	Drainage 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. Recycled aggregate	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 3
				Uniformity Coefficient	See Note 5	-	10	
				Plasticity Index	BS 1377: Part 2	Non Plastic		

				Los Angeles Coefficient	Clause 635	-	50	
				Moisture Content	BS 1377: Part 2	OMC-2%	OMC+2%	
6N	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.	grading	BS1377 Part 2 (on site)	Table 6/2	Table 6/2	End Product 95% of maximum dry density of BS1377:Part 4 (vibrating hammer method)
					BS-EN 933-2 (off site)	Table 6/5	Table 6/5	
				Uniformity Coefficient	See Note 5	10	-	
				Los Angeles Coefficient	Clause 635	-	40	
				Effective angle of internal friction (ϕ) and effective cohesion (c)	Clause 636	$\Phi = 35^{o}$ c = 0 kPa	NR	
				Permeability	Claus 640	10^{-3} m/s	NR	
				Moisture Content	BS 1377: Part 2	OMC-2%	OMC+2%	

Appendix 6/3

Requirements for Excavation, Deposition, Compaction

1. No excavation is to commence prior to the Contractor obtaining the appropriate permit to proceed.

2. No ground disturbing activities, including any earthmoving activities, are to commence prior to the Contractor obtaining any necessary permits or licences relating to protected species or habitats. If a licence or permit for such works is granted, those works shall only be undertaken during the periods as stated on the licence or permit under the direction of the licence or permit holder. A copy of the licence and/or permit shall be provided to the Employer prior to commencement of the relevant activities.

3. Material excavated and designated for treatment as Class U1A shall be transported to the appropriate process area for stockpiling and treatment. Clearly defined segregated stockpiles are required for different sub-classes of Class U1A. The maximum permitted height of stockpiles shall be 5.0 m.

4. Earthworks materials requiring to be stockpiled shall be stored in individual stockpiles for each earthworks class and end-use.

5. On completion of a stockpile the slopes shall be trimmed to falls to shed rainwater. Temporary drainage shall be provided at the base of the stockpile to collect runoff from the stockpile and to carry any surface water away from the base of the stockpile.

6. The Contractor shall provide and maintain such measures as necessary to eliminate the production of dust from the stockpile during the life of the stockpile.

Blasting for Excavation

1. Not required.

Cutting Face Requirements

1. Cut faces shall be made good using any of the methods set out in SHW 603.7. Isolated areas of soft, fragmented or insecure material shall be excavated and filled with material of similar surrounding characteristics.

2. In the case of drainage excavations at the toe of embankments, excavations shall be immediately followed by backfilling activities.

3. The Contractor shall provide additional drainage measures to intercept and discharge seepages from cutting slopes as required.

4. Cutting faces which are to have topsoil shall be made good prior to topsoil placement.

Watercourses, Including Ditches

1. The location of any existing water courses is as shown on the contract drawings.

2. Redundant watercourses shall be drained and cleaned in accordance with Clause 606.4. To be infilled with Class 1A in accordance with Table 6/1.

Embankment Construction

1. Prior to embankment construction, unless otherwise indicated on the design drawings, the formation shall be inspected, and proof rolled by the Contractor to identify any areas of soft ground (Soft means cohesive soils with an undrained shear strength of less than 40 kPa and/or organic soils).

2. Unless detailed otherwise on the design drawings, any soft areas shall either be:

    - Removed and replaced with a compacted suitable granular fill or lean mix concrete, or the embankment construction commenced from a basal starter layer comprising 600mm thickness of Class 6F2 material to facilitate adequate compaction of the fill above.

3. The suitability of the Formation Surface is to be determined by the Contractor prior to placing fill material.

4. Where earthworks embankments are to be constructed over existing road pavement or concrete hardstanding, the existing road pavement or concrete hardstanding is to be completely removed and treated as Class U1B or Class U1A for concrete material only.

5. Staged construction of embankments is not envisaged unless specifically detailed on the design drawings(s).

6. The Contractor shall not stockpile materials on other fill areas to a height greater than the finished embankment and/or surcharge pre-load height unless otherwise instructed or agreed by the Designer.

Compaction

1. Compaction shall comply with Clause 612 of the SHW.

2. Extra compaction in the top 600mm for Classes 2A, 2B, 2C and 2D over the full width of the embankment to Clause 612.10 is required. Temporary over-widening to achieve adequate compaction of the shoulders of the embankment will be permitted.

3. The frequency of field dry density testing shall be as set out in Appendix 1/5 except that for Class 2B material. An advance trial should be carried out on Class 2B material to determine the compaction achieved. Refer to end product compaction below for details on acceptable tests

4. The degree of compaction for non-engineered landscaped bunds will be sufficient to remove large voids and avoid subsequent excessive settlement. Landscaping is not intended to support foundations, fencing or vehicles.

5. A nuclear density gauge (NDG) is permitted for measuring field dry density where the NDG has been calibrated against sand replacement testing in similar materials. Calibration of the gauges will be checked weekly or as required by the Designer.

Benching or Shaping of Earthworks Slope Faces to Receive Fill

1. Where existing embankments are to be extended and where embankments are to be constructed on ground with a slope steeper than one in eight, such slope being measured at right angles across the width of the embankment, benching of the existing slope shall be formed as shown on the Earthworks Drawings. Bench heights are to be a multiple of the relevant compaction layer thickness.

2. Fill material in areas of benching shall be carefully placed and compacted to ensure that no voids occur at the upright steps of the benching.

3. Placing and compaction of the fill material shall continue to a level above an adjacent bench before material is placed upon that bench.

4. Four additional passes of the roller shall be made on the area within two metres each side of the upright face immediately following the compaction of the first layer of fill material on each bench.

Appendix 6/8

Topsoiling

1. Topsoiling shall be carried out with Class 5 materials complying with Table 6/1 and the requirements of Clause 618.3 shall apply.

2. Topsoil shall be treated in accordance with 618.4.

3. Topsoil is to be stripped off and stockpiled for re-use (pending acceptability testing) in accordance to Clause 602.10. Surplus or unacceptable materials shall be disposed of by the Contractor.

4. The thickness of topsoiling will depend on that taken from the initial site strip. No additional topsoil is intended to be imported other than where specified on the landscaping designed, which should be laid in accordance with Series 3000.

5. All excavated topsoil shall be kept separate from excavated subsoil.

6. Topsoil should not be removed from below the spread of trees to be retained.

7. Topsoil heaps are to be not more than 2m high with maximum side slopes of 1 (vertical) in 1.5 (horizontal).

8. Topsoil mounds to be stored for periods of greater than six months shall be seeded with a mix of slow growth grass seed.

9. No stockpiles of topsoil, or any other material shall be stored within the root zone of mature trees or in areas where existing trees/habitats may be damaged or where surface run off to watercourses would be detrimental to water quality

10. Topsoil heaps shall be treated at appropriate times to prevent seeding of weeds. No other material is to be placed on the top of topsoil heaps and no construction plant is to pass over them.

11. No topsoil shall be used which is derived from sites contaminated with pernicious weeds. Pernicious weeds shall include, but not exclusively the following:

- Docks - (*Rumex spp*)
- Thistles (*Cirsium spp*)
- Ragwort – (*Senecio spp*)
- Himalayan Balsam – (*Impatiens glandulifera*)
- Japanese Knotweed – (*Fallopia japonica*)
- Giant Hogweed – (*Heracleum mantegazzianum*)
- Rosebay Willow herb – (*Epilobium angustifolium*)
- Couch grass – (*Agropyron repens*











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APPENDIX D – TECHNICAL NOTES TN1.1 AND TN1.2

RoC CONSULTING

Technical Note 1.1
Residual Tannery Contamination

Mayfield Park, Manchester

for

Mayfield Partnerships Ltd



03 / 02 / 2021

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Technical Note 1.1
Residual Tannery Contamination

On

Mayfield Park, Manchester

DESCRIPTION	DATE	AUTHOR		
Technical Note 1.1 Residual Tannery Contamination	03/02/2021	 Alex Smiles BSc (Hons) C.Env MIEMA FGS		
REVISION	**DESCRIPTION**	**DATE**	**AUTHOR**	**APPROVED BY**

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1.0 Introduction

1.1 Background

1.1.1 RoC Consulting has prepared the following Technical Note (TN 1.1) at the instructions of the Mayfield Partnership Ltd (the client) to describe the potential risks associated with the former operations a Tannery facility, historically located within the proposed Mayfield Park regeneration site. In addition, the note outlines the scope of mitigation and remedial measures that should be employed by construction contractors during the proposed redevelopment of this portion of the site,

1.1.2 The Technical Note follows on from a number of ground investigation reports completed across the proposed Mayfield Park regeneration site namely :

1) Geoenvironmental and Geotechnical Desk Study Report prepared by Buro Happold Ltd in August 2017 for the Mayfield Regeneration Site (report ref : 035548).

2) Phase 2 Site Investigation Report, Mayfield Park, prepared by RoC Consulting in December 2020 (report ref: 4153-ROC-XX-XX-RP-ES-P2SI1).

3) Phase 3a Remediation Strategy, Mayfield Park, prepared by RoC Consulting in December 2020 (report ref: 4153-ROC-XX-XX-ES-RP-P3RS2).

1.1.3 It is recommended reference is made to the findings and results of the above reports when reviewing the current Technical Note.

1.2 Terms of Reference

1.2.1 The Technical Note was collated following receipt of an instruction from representatives of the Mayfield Partnership Ltd in February 2021.

1.3 Objectives

1.3.1 The objectives of the desk-based study were:

- To provide further information on the current and historical pattern of operations within the footprint of the former Tannery operation.
- To summarise ground investigations completed in the area of the Tannery and describe any observations of note with respect to potential risks posed to human health and other environmental receptors.
- To outline the scope of remediation and mitigation measures that may be required during the redevelopment of this portion of the site.

2.0 Background Information

2.0.1 The following chapter provides an overview to most salient findings of the desk based and intrusive site investigations completed within the footprint of the former Tannery Site. The summary has been taken from information and records provided in the aforementioned ground investigation reports which should be reviewed in conjunction with this appraise.

2.1 Historic Tannery Operations

2.1.1 The presence of animal tanning operations was first noted on site within the Buro Happold Phase 1 Desktop study historical map review. The area in question is located to the central and southern portion of the proposed Mayfield Park site (as indicated on the enclosed drawing ES300). The tannery operations straddle the boundary between the proposed Mayfield Park and adjacent Plot M "Republik" proposed commercial office development.

2.1.2 The Tannery is present on earliest map records (c1850) occupying a roughly rectangular parcel of land to the central and western portion of the future Ardwick Tannery site. The operation comprises a number of buildings to the central and northern extent and tan pits to the south and east (see sketch TN100 within Appendix A for historical records for this and subsequent development across the site).

2.1.3 The operation is expanded during the period leading up to the 1890s with the aforementioned tan pits removed and constructed on top of. The 1890 map record does not indicate any tan pits within the external area of the Ardwick Tannery site and it is likely such operations were now taking place in side one of the new structures located on site.

2.1.4 The tannery site is cleared and redeveloped during the period between 1890 and 1908 to comprise the Chapelfield Indian Rubber works. This development includes the demolition and removal of all structures relating to the tannery with new buildings occupying a different scale and footprint across this portion of the site.

2.1.5 The rubber works in this configuration is evidence on site during the period leading up to 1948 when the site is again cleared and redeveloped into its most recent arrangement, with a large brick and steel frame warehouse structure occupying the entire footprint of the former tannery. This most recent redeveloped created a split level between the northern and southern portion of the site with a retaining wall present roughly along its centre (see sketches TN101 and 102 within Appendix A for contemporary photographic records of the site).

2.1.6 Drawing ES301 (provided within Appendix A) has been collated to illustrate the relationship between the current site, historical tannery operations and proposed park / office development.

2.2 Present Day Site Description

2.2.1 The site currently comprises an area of recently cleared warehousing that dates from the aforementioned 1948 Rubber Works development, although its most recent operation prior to demolition related to Hillcare electrical lighting suppliers and wholesales.

2.2.2 The building was demolished to ground floor slab level in late 2018 with a retaining structure left in situ that separates the upper southern portion of the former building with the lower northern extent. The northern portion of the site is bounded by the River Medlock which runs in a roughly south east to north west orientation past the site.

2.2.3 Photographs of the site are provided on sketch TN102 within Appendix A.

2.3 Ground investigation information

2.3.1 A program of ground investigations has been completed across both the proposed Park and Plot M office development within the footprint of the former Tannery operation. These investigations comprised the formation of x11 exploratory boreholes and trial pits (the locations of which are indicated on enclosed drawing ES300). In addition, archeological investigations were also completed in the area of the former Tannery by Salford Archeology, comprising the formation of a slit trench circa 50m in length (a photograph from which is provided on sketch TN102 within Appendix A.

2.3.2 Ground investigations in this area (exploratory hole locations for which are provided on the aforementioned drawing ES301) two ground models;

- Area to north of retaining wall; the lower portion of the site set slightly above the River Medlock comprises a concrete floor slab resting directly on top of the Sandstone bedrock. Limited (if any) residual made ground is noted in this area with structures and floor slabs constructed on top of the bedrock.

- Area to the south of the retaining wall; the upper portion of the site is characterised by deeper demolition type fill made ground deposits (up to 3m in depth) overlying reworked clay and weathered Sandstone at depths circa 4m.

2.3.2 None of the exploratory boreholes formed across the site indicated the presence of deleterious or significantly contaminated soils, with the bulk of made ground comprising an ashy demolition type granular fill material similar in its make-up and chemical composition to soils noted across the wider Mayfield Park site. No evidence of any animal products or residual organic material was noted in any of the exploratory holes formed across the site.

2.3.3 Subsequent chemical analysis of soil samples obtained during the ground investigation works in this area revealed minor of elevations Heavy Metals and Poly Aromatic hydrocarbons; similarly, groundwater sampling and analysis from the deep borehole BH102 in this area indicates an absence of PAH and TPH contaminants with only marginally elevated heavy metal concentrations.

2.3.4 The composition and quality of made ground material reported beneath this portion of the site is typical of the demolition type material that has been reported elsewhere across the wider Mayfield park development site.

2.3.5 When compared with other portions of the wider park site the presence of contamination hotspots beneath this portion of the site much less that other zones (e.g., proposed multi use game area to the north and east). This variance can be attributed to the relatively shallow depth to Sandstone beneath this portion of the site and limited depth of made ground that is present as a result.

2.4 Development proposals

2.4.1 The site of the former Tannery is to be developed into a combination of the Mayfield Park and Plot M "Republik" commercial office development. The park development, the approx. extent of which is indicated on drawing ES300 within appendix A, will comprise a riverside walkway with soft landscaping and planting on the banks of the River Medlock. The river wall in this area will be partially reduced and strengthened and the existing Medlock culvert (to the north and west) removed to open up the river channel.

2.4.2 Construction activities associated with these works will include the breaking out of existing concrete floor slabs, repair works to the river walls and installation of hard and soft landscaping. Site levels are to be left at or near to existing in this area with limited requirement for significant below ground excavations (excluding those required for river wall repair, deculveritng and hard / soft landscaping works. All areas of soft landscaping will be subject to clean soil cover systems in accordance with the requirements of the RoC Consulting Phase 3a Remediation Strategy and Landscape Architects.

3.0 Tannery Risk Assessment & Suggested Mitigation Measures

3.0.1 We have considered the residual risks posed from Tannery Contamination containing materials beneath this portion of the site in the context of both historical and ground investigation information outlined in Section 2.0 (and further expanded upon in our Phase 2 Site Investigation report). We consider the risks posed toward identified receptors (i.e., construction persons during development works and the adjacent River Medlock) to be **Low**.

3.0.2 Our justification for this assessment is as follows:

1) The portion of the site containing the Tannery was completely cleared and redeveloped on two separate occasions since the works closed (in 1908 and 1948). Subsequent redevelopment of the site was comprehensive with the most recent operation covering the entire former Tannery footprint. It is likely these clearance operations will have included the removal of existing structures and breaking out / backfilling of below ground structures. As such the potential for structures or features dating from the Tannery operation will be low.

2) No evidence of deleterious organic or animal material has been identified in any of the ground investigation works completed across the site. More intrusive archaeological trial trenches completed in this area by Salford Archaeology also failed to reveal the presence of such material. This supports the hypothesis subsequent phases of development have cleared the majority of traces of tannery operations from the site.

3) The portion of the proposed Park that sits within the former Tannery site footprint comprises the area of the north of the existing retaining wall; the ground model in this area is known to contain little (if any) made ground deposits with Sandstone bedrock at or very close to the grounds surface in this area.

4) The “Plot M” development plot to the south (and out with of the current Park application / proposed works) has deeper made ground deposits, although no evidence of tannery related material was noted in exploratory holes during investigations in this area.

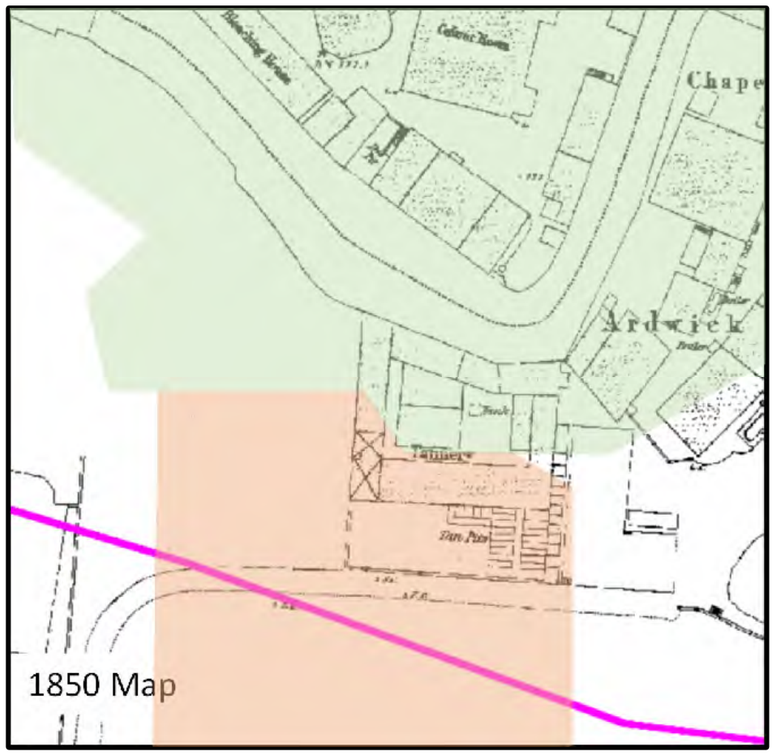
5) The redevelopment of the site to facilitate proposed park construction will see limited change in site levels and associated excavation works. Remedial works are proposed to the River Walls and Medlock culvert which will require excavation works, however across the wider site there is limited potential for significant bulk earthwork operations (and potential exposure of any residual tannery waste product).

3.0.3 In view of the above we do not consider it is necessary to complete further investigation works across this portion of the site to check for the presence of animal product or other material impacted by tannery operations.

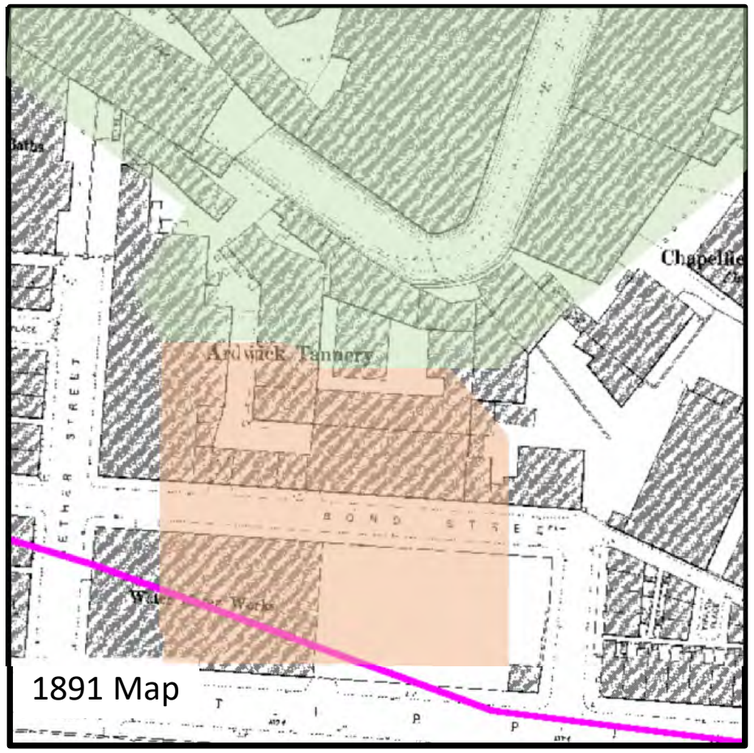
3.0.4 However, in recognition of the potential risks posed we would recommend contractors adopt a watching brief and put in place specific emergency control measures in the event tannery related contamination is observed during excavation works in this area (further details of which are provided within Appendix B of this note).

3.0.5 In addition, the reuse of soils generated during works in the area of the former Tannery shall not be completed until they have been suitably inspected and verified as being free from potential tannery related contamination.

Appendix A - Site Photos & Drawings



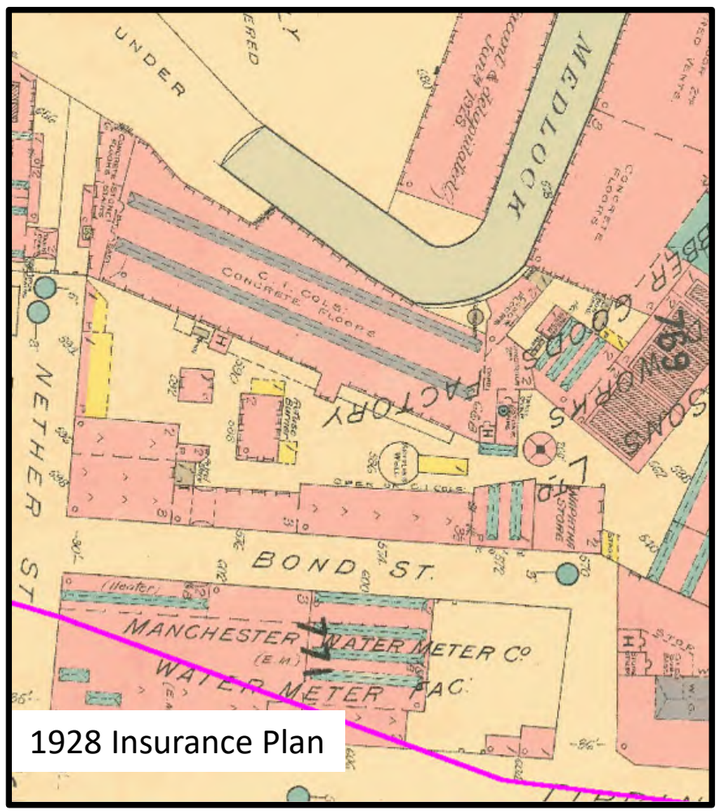
1850 Map



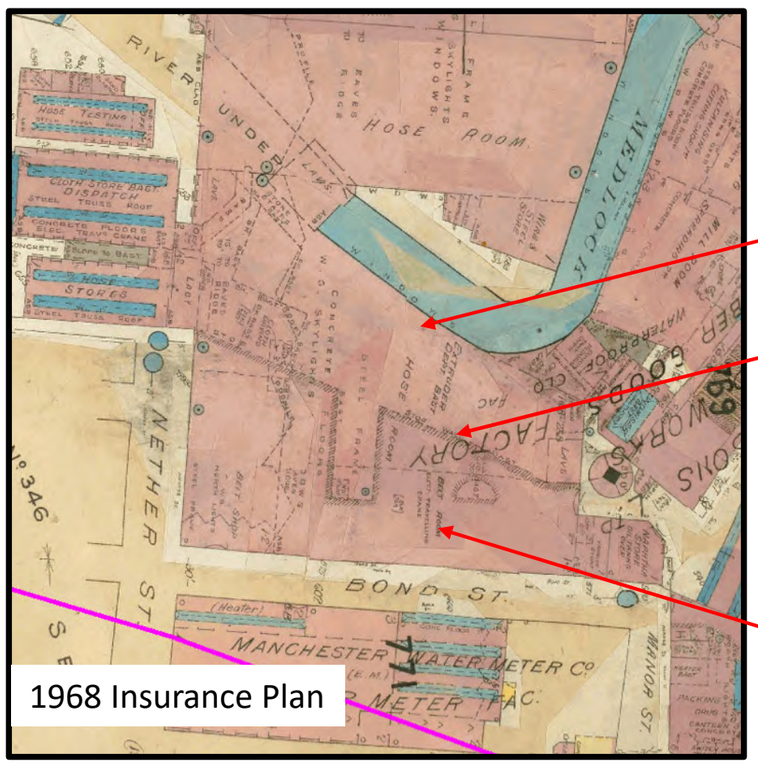
1891 Map

Approx. location of proposed Mayfield Park relative to Tannery site

Approx. location of proposed Plot M Office relative to Tannery Site



1928 Insurance Plan



1968 Insurance Plan

Lower former sub basement level

Retaining structure

NORTH

Upper level

RoC CONSULTING	JOB NO	4153	SKETCH NO	TN100	DRAWN BY :AS 03 02 2021
	PROJECT TITLE	Mayfield Park, Manchester	SKETCH TITLE	Historical Tannery Operations	

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Approx. location of proposed Mayfield Park relative to current site

Approx. location of proposed Plot M Office relative to current site

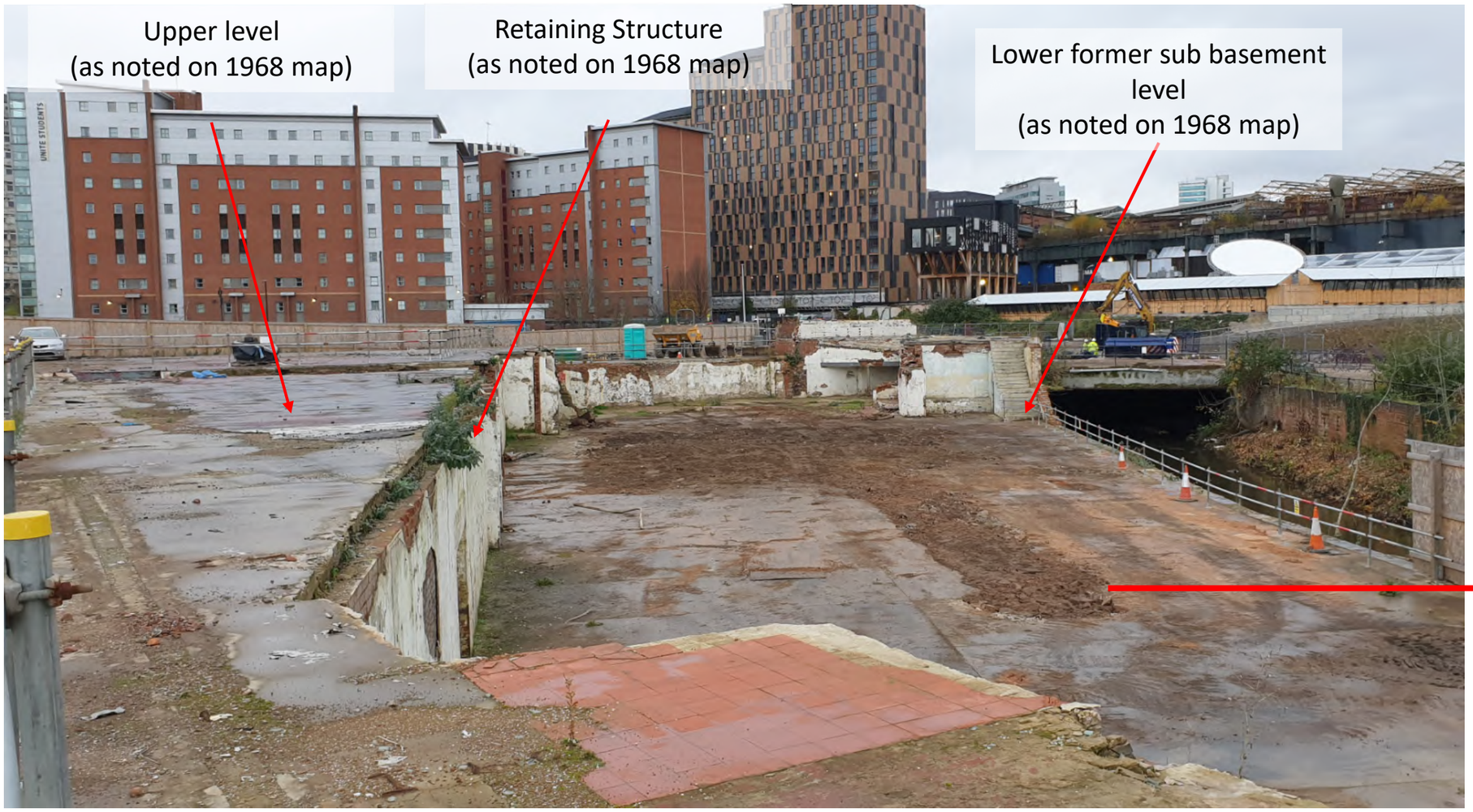
Approx. maximum extent of Tannery operations

NORTH

JOB NO	4153	SKETCH NO	TN101	DRAWN BY :AS 03 02 2021
PROJECT TITLE	Mayfield Park, Manchester	SKETCH TITLE	Current aerial view of site showing approx. developments and tannery operations	

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Looking west across the former Tannery site in October 2020 showing extent of upper and lower levels & recently completed archeological trenches



Retaining structure

Slit trench formed through lower level showing sandstone beneath existing floor slab

JOB NO	4153	SKETCH NO	TN102	DRAWN BY :AS 03 02 2021
PROJECT TITLE	Mayfield Park, Manchester	SKETCH TITLE	October 2020 Site Photographs	

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NOTES

- RO BH101 — PROPOSED DEEP MONITORING BOREHOLE
- REC BH02 — EXISTING DEEP MONITORING BOREHOLE
- PH305 — EXISTING BOREHOLE LOCATION FORMED WITHIN OR ADJ FORMER TANNERY OPERATION
- PROPOSED PARK DEVELOPMENT BOUNDARY
- PROPOSED PLOT M DEVELOPMENT BOUNDARY

DRAWING NOTES

1) BOREHOLES PROPOSED ACROSS SITE TO ASSESS GROUNDWATER LEVELS AND QUALITY WITHIN THE UNDERLYING BEDROCK AQUIFER.
2) A TOTAL OF 7 BOREHOLES ARE PROPOSED WHICH ARE TO BE FORMED USING ROTARY OPEN HOLE DRILLING METHODS TO DEPTHS RANGING BETWEEN 15 AND 20m BELOW GROUND LEVEL.
3) MONITORING STANDPIPES TO BE INSTALLED AT BOUNDARY BETWEEN DRIFT DEPOSITS AND WEATHERED SANDSTONE BEDROCK. WELLS TO BE TAKEN TO FULL DEPTH OF BOREHOLES FROM THIS LEVEL (EITHER 15 OR 20m BELOW GROUND LEVEL
4) ALL BOREHOLES TO BE INSTALLED WITH TOP HAT STYLE RAISED COVERS

REV.	DATE	DETAILS	DRN.	CHK.

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CLIENT
MAYFIELD PARTNERSHIPS LTD

PROJECT TITLE
MAYFIELD MASTERPLAN

DRAWING TITLE
ARDWICK TANNERY SITE LAYOUT c1850 AND 1890

PROJECT No.	DRAWING No.	REV.
4153	ES301	R1

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Appendix B – Former Tannery Product Risk Mitigation Strategy

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Former Tannery Site, Risk Mitigation Note

The following note has been prepared for all contractors to review and adhere with when completing any excavations or works that may break ground in the area of the former Ardwick Tannery (see Fig 1.0 below for location).



Fig 1.0 : Portion of site containing former Tannery operation.

Ground contamination assessments have identified this portion of the site was formerly used as a Tannery and a residual risk of animal by product encounter may be present in this area. Investigations completed to date in this area have failed to identify any such presence, however all contractors are obliged to follow the requirements of this briefing note and adopt a Tannery Contamination **Watching Brief & Discovery Strategy** the scope of which is provided overleaf.

Tannery Contamination: Watching Brief & Discovery Strategy

1) All proposed works that may break ground in the area of the former Tannery (as defined on Fig 1.0 of this note) will be subject to a watching brief.

2) This watching brief applies to all machine and hand dug activities in this area (regardless of purpose, scale or depth) and will continue until natural strata is encountered in excavations (either weathered Sandstone bedrock or natural clays / sands).

3) Persons working on any such excavations shall visually inspect soils for the presence of the following materials:

   - Animal bones
   - Animal hair
   - Animal carcase or flesh
   - Animal hides
   - Significant quantities of deleterious or organic rich materials or sludge

4) Where materials or contaminants similar to those outlined in point 3 are noted contractors shall immediately cease all operations and complete the following steps:

   - Cease all excavations and move all site personnel to a safe distance.
   - Immediately backfill and cover impacted material with arisings from excavations to at least a 1m thickness with unimpacted material.
   - Whilst backfilling excavations the site manager should be alerted to the discovery.
   - As required deploy any temporary mitigation measure to stabilise adjacent land or structures (e.g., if working in close proximity to the River Medlock walls or culvert) without disturbing the affected area).
   - Record the affected area both in terms of its location and spatial extent
   - As required adjust and reroute site operations away from the affected area

5) Once these immediate actions are undertaken the affected area shall be cordoned off from site operations with appropriate barriers and signage (similar to mitigation measures employed when areas of Asbestos or other grossly contaminated soils are revealed during site works).

6) RoC Consulting and the site Resident Engineer shall be informed as soon as is reasonably practicable to attend site and further discuss the discovered material and remediation measures. In addition, notification may also be required to Manchester City Councils Environmental Protection Div, the Environment Agency and the HSE (depending on the extent / severity of contamination)

7) All future works in the affected area to further investigate, remove and remediate shall be completed in accordance with guidance document “Guidance on assessing risk of Tannery Contamination on building land” with appropriate approvals and sanctions from regulatory authorities.

It is recommended construction contractors review and incorporate the requirements of this briefing noted into all excavation permits being issued for the area indicated in Fig 1.0 with all operatives briefed as to their obligations under this strategy. Any questions or clarifications should be brought to the attention of RoC Consulting or the site Resident Engineer.











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Technical Note 1.2
Hydrogeology & Groundwater Contamination

Mayfield Park, Manchester

for

Mayfield Partnerships Ltd



08 / 02 / 2021

COMPLEX CHALLENGES ...
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Technical Note 1.2
Hydrogeology & Groundwater Contamination

On

Mayfield Park, Manchester

DESCRIPTION	DATE	AUTHOR		
Technical Note 1.2 Hydrogeology & Groundwater Contamination	08/02/2021	 Alex Smiles BSc (Hons) C.Env MIEMA FGS		

REVISION	DESCRIPTION	DATE	AUTHOR
R1	Update to state values used in site won soils Level 1 Leachate criteria	09 02 2021	AS
R2	Update to state revision to agreed Level 1 Leachate criteria following discussion with EA	17 02 2021	AS
R3	Update to drawing ES300 following comments from MCC	24 02 2021	AS

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1.0 Introduction.

Following the recent submission of our ground investigation information to the Environment Agency, and receipt of comments in January 2021 regarding our findings and recommendations, RºC Consulting has prepared the following Technical Note (TN 1.2) at the instructions of the Mayfield Partnership Ltd (the client) to:

1) Summarise findings of our ground investigation works completed to date and explain in further detail potential risks toward controlled waters at Mayfield.

2) Outline the scope of additional ground investigation and subsequent interpretation to further assess risks posed to controlled waters as required by the EA

3) State how supplementary information will be obtained and incorporated into the risk assessment as it becomes available.

4) Invite comment and request regulatory approval for the recommendations contained in this note so that limited remediation activities can commence whilst further data gathering investigations are concluded.

This Technical Note follows on from a number of ground investigation reports completed at the proposed Mayfield Park regeneration site namely:

- Geoenvironmental and Geotechnical Desk Study Report prepared by Buro Happold Ltd in August 2017 for the Mayfield Regeneration Site (report ref: 035548).

- Phase 2 Site Investigation Report, Mayfield Park, prepared by RoC Consulting in December 2020 (report ref: 4153-ROC-XX-XX-RP-ES-P2SI1).

- Phase 2 Site Investigation Report, Plots O and N Masterplan, prepared by RoC Consulting in December 2020 (report ref: 4134-ROC-XX-XX-RP-ES-P2RS1).

- Phase 2 Site Investigation report, Plot M Mayfield Masterplan, prepared by RoC Consulting in December 2019 (report ref:LD/AS/ P2/3986)

- Phase 3a Remediation Strategy, Mayfield Park, prepared by RoC Consulting in December 2020 (report ref: 4153-ROC-XX-XX-ES-RP-P3RS2).

- Phase 3a Remediation Strategy, Mayfield Park, prepared by RoC Consulting in December 2020 (report ref: 4134-ROC-XX-XX-ES-RP-P3RS1).

In addition to the above, and located outside of the current planning application boundary, reference has also been made to the results of a Phase 2 Site Investigation completed by RoC Consulting across Plots G & H of the wider Mayfield masterplan, located to the east of the proposed Park site in June 2019.

2.0 Conceptual Site Model - Groundwater.

The Phase 2 site investigation revealed a ground model of a predominantly granular and permeable nature, comprising made ground and alluvial sand, silt and gravels overlying a highly / completely destructed Chester Formation Sandstone (principal aquifer) beneath the Site. The weathered Chester Formation was found to occur at depths circa 3-4m beneath the site, although at some locations toward the site's centre, bedrock was encountered at or around ground level. Made ground, which predominantly comprised a mixture of demolition material and ashy fill, extended to depths ranging between 0.3m and 5.0m with a mean thickness across the site of 2.17m.

Chester Formation Sandstone is overlain in some places by a fine silty alluvial Sand however at some locations made ground materials directly overly it (typically where it occurs at shallow depths beneath the site). A layer of lower permeability glacial clay was also noted, although this was limited to the northern and eastern portion of the site.

Deeper boreholes formed on the Plot O, M and N sites, as well as across the G and H plots off site to the east, indicate the destructed weathered fraction of Chester Formation Sandstone extending to depths in excess of 10m below ground, typically recovered from core holes as a gravelly medium to coarse orange sand with occasional intact rock core inclusions.

Groundwater monitoring in these deep boreholes indicates a water table is present beneath the Plot O and N portion of the site at a depth circa 7-8m below ground level and it is likely similar conditions exist beneath the wider Mayfield park site, with surface water infiltration percolating down through shallow made ground and natural soils through the destructed upper Chester Formation Sandstone.

A total of 111 soil samples of made ground and natural strata were collected and submitted for analysis during the site investigation works across the Mayfield Park and adjacent commercial office plot site. 24 samples of made ground were submitted for leachability testing and groundwater from deep boreholes on Plots O, N and M was analysed for a range of contaminants.

Multiple sources of soil contamination have been identified relating to former industrial operations. These contaminants are predominantly held within made ground deposits and take the form of localized hotspots across the site. Limited evidence visual or olfactory of contaminant migration or leaching into underlying Alluvial soils or Sandstone bedrock was noted during ground investigation works, either via direct observation during the formation of exploratory holes / trial pits or subsequent laboratory analysis.

Results of the leachate analysis indicate that a small proportion of the ashy made ground contains leachable concentrations of Arsenic, Chromium, Benzo(a)pyrene and Benzo(b)fluoranthene above Level 1 groundwater screening values (i.e. UK Drinking Water Standards). More grossly contamination "hotspots" were also revealed relating to former site operations, namely a HGV serving yard and a resultant plume of hydrocarbon contamination that has impacted soils beneath this portion of the site.

In addition, a Tannery was known to be present on site, although no evidence of tannery wastes were reported during ground investigations in this area, a residual risk will remain and a watching brief is proposed.

Our assessment concluded that, whilst the removal of existing hard standing coverage across the site may promote the generation of leachate and could impact groundwater quality, it is noted the proposed earthwork operations will result in an overall reduction in the depth and volume of made ground that is present beneath the site.

More significant sources of contamination (e.g. the aforementioned hydrocarbon contamination within the HGV service yard were to be removed and this reduction in made ground volume will lessen the overall contaminative potential of the site (particularly with respect to the movement and generation of leachate and contaminated groundwater).

A Phase 3a Remediation Strategy was collated based on the proposed end use scenario for the site (public park) with soil reuse criteria provided beneath areas of soft and hardscape. In addition, further information was provided regarding the removal of more grossly contaminated hotspots during development works, as well as site validation requirements.

We note comments received from the Environment Agency regarding the characterisation of the hydrogeology beneath the site and specifically their requirement to further investigate ground water quality and further consider the risks posed.

A scope of works for additional exploratory works and subsequent assessment is provided below for review by the regulatory authorities and comment.

3.0 Risk Based Remedial Targets

Sufficient information is currently available to derive Level 1 Soil Remedial Targets for all the contaminants of concern using the EA's remedial target methodology. The remediation strategies for the site will be updated to include these remedial targets where necessary such that the groundwater in the Chester Formation Sandstone is protected and remediation activities can proceed using the precautionary Level 1 assessment values, subject to regulatory approval.

An initial Tier 1 comparison of leachate data for soils obtained during ground investigations indicates elevated concentrations of Heavy Metals (Arsenic, Chromium & Lead) and Poly Aromatic Hydrocarbons (Benzo(a)pyrene and Benzo(b)fluoranthene); these are defined as our contaminants of concern. In addition, more localised hotspots of contamination have been identified arising from point sources (e.g. HGV service and fuel storage operations comprising TPH and BTEX compounds).

Given the potential risks posed from the contaminants of concern to controlled waters it will be necessary for soils generated and proposed for reuse in earthwork operations to be screened against target values for the protection of controlled waters. This assessment will comprise a comparison of leachable concentrations for the contaminants against values agreed with the Environment Agency for the protection of controlled waters as described in Table 1.0 overleaf.

Contaminant (Leachable levels)	Tier 1 Screening Value (µg/l)	Source
Arsenic	30 µg/l	The Water Supply (Water Quality) Regulations 2016 (SI 2016/619)
Chromium (total)	50 µg/l	
Lead	18 µg/l	
Benzo(a)pyrene	0.01 µg/l	
Benzo(b)fluoranthene	0.1 µg/l	

Table 1.0 : Interim Level 1 Leachate Screening Criteria for Material Reuse

This approach will be adopted in the interim to allow earthworks to progress whilst further investigations of the groundwater regime and chemical quality are undertaken (the scope of works for which is provided in Section 4.0 below)

When supplementary information on groundwater and aquifer properties such as background quality, infiltration through cover systems, hydraulic conductivity, gradient, distance to compliance point etc becomes available, the values indicated in Table 1.0 will be advanced to a Level 2/3 assessment site specific values and the remedial targets revised accordingly. The content of our Phase 3a Remediation Strategy will then be updated to reflect these updates.

Where remediation requires removal or treatment of material affected by point sources of mobile organic contaminants (including Naphthalene, TPH & BTEX compounds) the assessment criteria for removal of contaminated material will also be reviewed so as to be protective of groundwater.

4.0 Additional Ground Investigation Works

A program of deep borehole investigation works is proposed to intercept and sample ground water table beneath the site and assess what, if any, impacts may have occurred as a result of surface industrial activity.

Boreholes have been located to establish the groundwater table beneath the site as detailed in Drawing 4153 ES300 within Appendix A. The recommended scope comprises 7 additional deep boreholes to be extended to depths between 15 and 20m below site to intercept groundwater in the principal aquifer and permit its monitoring and sampling.

Water samples will be obtained from the supplementary wells and any existing serviceable wells at the site and screened for Heavy Metals, PAH and TPHCWG compounds in order to assess what (if any) impacts the site may be having on the Principal Aquifer.

The existing reports contain sufficient information to identify the contaminants of concern and the sources of contamination which could potentially impact groundwater in the Chester Formation Sandstone. Sufficient information is available for remediation to proceed on a precautionary Level 1 Assessment basis. On receipt of the results of the supplementary investigation the assessment and re-use criteria contained in the remediation strategy will be updated to address any with Level 2/3 assessment criteria.

5.0 Recommendations

The recommendations of this technical note are:

- The assessment and re-use criteria for the diffuse contaminants contained in ashy made ground will be to include Level 1 screening values for leachable substances identified in exceedance of screening criteria (namely Arsenic, Chromium, Lead, Benzo(a)pyrene and Benzo(b)fluoranthene). The criteria for point sources of mobile organic contaminants (including Naphthalene, TPH & BTEX compounds) will also be updated on the same basis so as to be protective of groundwater.

- The results from this review will be used to revise the Phase 3a Remediation Strategy and specifically screening criteria for material reuse during earthworks operation.

- A program of supplementary ground investigation works will be completed to intercept and assess groundwater quality. The results from these investigations will be used to further refine the assessment of risks presented within our Phase 2 Site Investigation report.

- When the results of the supplementary investigation are reported, the assessment and re-use criteria contained in the remediation strategy will be updated with Level 2/3 assessment criteria.

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Appendix A - Drawings

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RO102

RO101

PLOT O BH110

RO103

RO106

NO EARTH / CONSTRUCTION TO BE COMPLETED IN THE MULTI USE GAMES AREA / FORMER CITY EXACTIONS YARD UNTIL FURTHER NOTICE

SITE INVESTIGATION ZONE 3: MULTI USE GAME AREA (MUGA)

RO104

NO EARTH / CONSTRUCTION TO BE COMPLETED WITHIN 8m BUFFER OF RIVER MEDLOCK UNTIL FURTHER NOTICE

RO105

PLOT N BH108

PLOT M BH102

RO107

NETHER STREET

BOND STREET

RIVER MEDLOCK

ALL BOREHOLE MONITORING WELLS INDICATED ON THIS PLAN TO BE RETAINED UNDAMAGED

ALL SITE OPERATIVES TO BE MADE AWARE OF MONITORING WELL LOCATIONS AND ADJUST WORKING PRACTICE ACCORDINGLY

NOTES

ES300 EA ADDITIONAL WORKS

- RO101 — 2021 GROUNDWATER MONITORING BOREHOLE
- BH110 — EXISTING MONITORING WELL TO BE USED FOR ADDITIONAL SAMPLING
- SI ZONE 1: PARK LAWNS
- SI ZONE 2: WILD SCAPE AREA
- SI ZONE 3: MULTI USE GAME AREA (MUGA)
- SI ZONE 4: SOUTH WEST PARK AREA
- SI ZONE 5: HOYLE STREET WEST
- 8M EXCAVATION EXCLUSION ZONE UNTIL FURTHER NOTICE
- MUGA EXCAVATION EXCLUSION ZONE UNTIL FURTHER NOTICE
- PROPOSED EXTENT OF DECULVERTING
- AREA OF EXPOSED RELICT STRUCTURES
- HISTORICAL BREWERY FOOTPRINT

DRAWING NOTES

1) BOREHOLES PROPOSED ACROSS SITE TO ASSESS GROUNDWATER LEVELS AND QUALITY WITHIN THE UNDERLYING BEDROCK AQUIFER.
2) A TOTAL OF 7 BOREHOLES ARE PROPOSED WHICH ARE TO BE FORMED USING ROTARY OPEN HOLE DRILLING METHODS TO DEPTHS RANGING BETWEEN 15 AND 20m BELOW GROUND LEVEL.
3) MONITORING STANDPIPES TO BE INSTALLED AT BOUNDARY BETWEEN DRIFT DEPOSITS AND WEATHERED SANDSTONE BEDROCK. WELLS TO BE TAKEN TO FULL DEPTH OF BOREHOLES FROM THIS LEVEL (EITHER 15 OR 20m BELOW GROUND LEVEL
4) ALL BOREHOLES INSTALLED WITH TOP HAT STYLE RAISED COVERS

4153 : Mayfield Bedrock Phase 2 SI

Existing borehole monitoring well sampling

BH ID	X	Y	Notes
PLOT M BH102	385105.3	397518.5	Monitoring well currently buried by site operations, to be relocated prior to use
PLOT N BH02	385016	397498.2	Monitoring well cover siezed, to be opened and sampled
PLOT N BH107	385004.4	397528.5	Checked 05/02/21 and read to sample
PLOT N BH108	385029.8	397519.1	Checked 05/02/21 and read to sample
PLOT O BH110	385020.6	397590.8	Monitoring well currently buried by site operations, to be relocated prior to use

Proposed borehole monitoring well sampling

ID	X	Y	Notes
RO101	385044.72	397604.07	Final depth 20m, monitoring well to be sealed from weathered SST to base. Leachate samples to be taken from MG
RO102	385075.24	397635.77	Final depth 15m, monitoring well to be sealed from weathered SST to base. Leachate samples to be taken from MG
RO103	385097.53	397560.72	Final depth 15m, monitoring well to be sealed from weathered SST to base. Leachate samples to be taken from MG
RO104	385237.75	397592.61	Final depth 15m, monitoring well to be sealed from weathered SST to base. Leachate samples to be taken from MG
RO105	385249.43	397537.46	Final depth 20m, monitoring well to be sealed from weathered SST to base. Leachate samples to be taken from MG
RO106	385161.28	397589.62	Final depth 15m, monitoring well to be sealed from weathered SST to base. Leachate samples to be taken from MG
RO107	385128.78	397526.28	Final depth 15m, monitoring well to be sealed from weathered SST to base. Leachate samples to be taken from MG

REV.	DATE	DETAILS	DRN.	CHK.

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PROJECT TITLE: MAYFIELD MASTERPLAN

DRAWING TITLE: SITE WIDE DEEP GROUNDWATER MONITORING WELLS

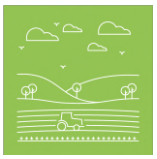
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