

SCIENCE MUSEUM GROUP

Building ONE | The Science Museum Group at Wroughton | December 2017



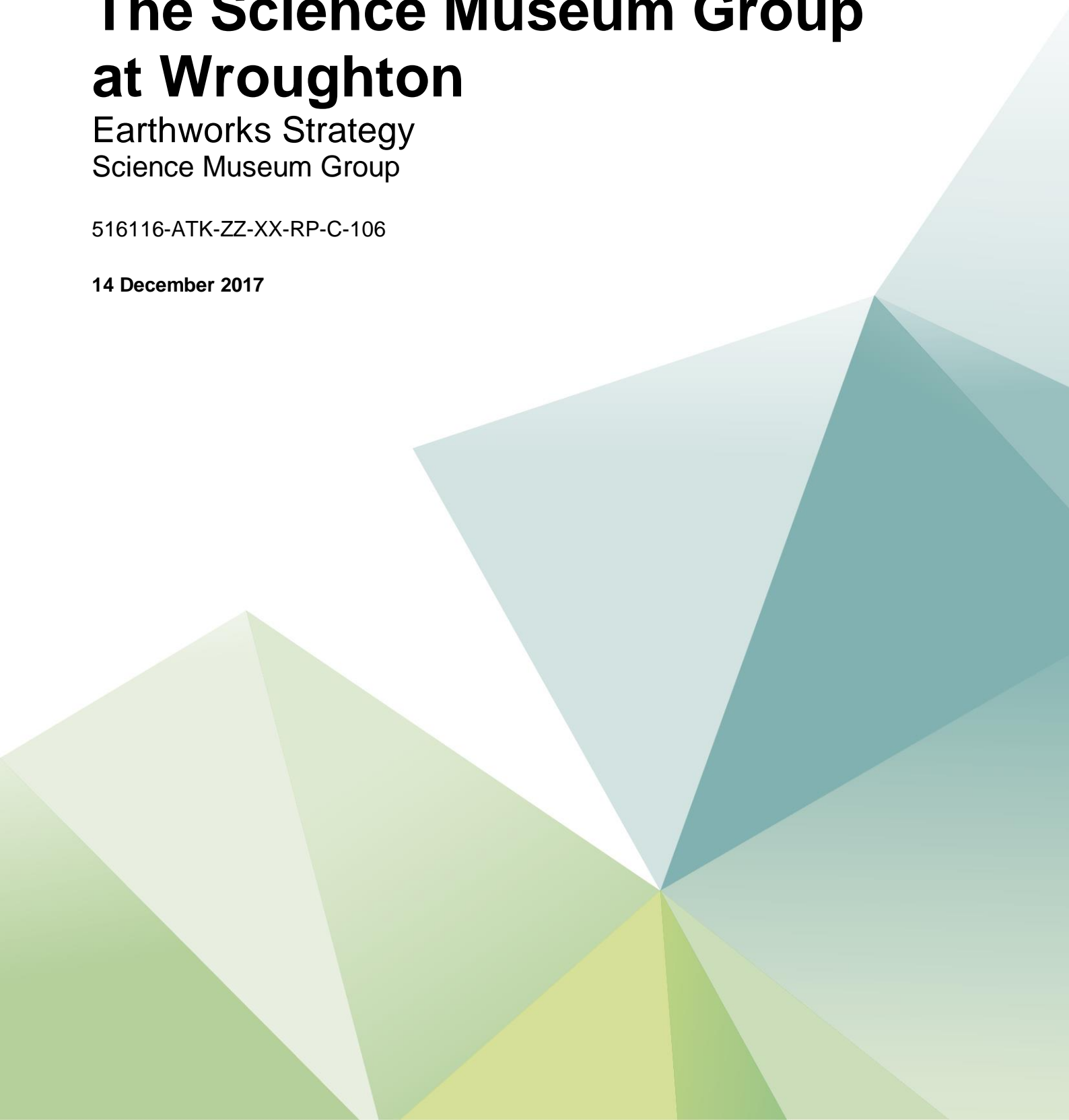
Earthworks Strategy

Building ONE, The Science Museum Group at Wroughton

Earthworks Strategy
Science Museum Group

516116-ATK-ZZ-XX-RP-C-106

14 December 2017




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This document has 14 pages including the cover.

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Executive summary

The former RAF Wroughton airfield in Wiltshire is owned and occupied by the Science Museum Group (SMG), which uses the former aircraft hangers for storing parts of their collection, including large objects. SMG will construct a large portal framed unit of an approximate footprint of 27,000m², referred to as Building ONE. This report has been prepared to outline the engineering earthworks strategy to construct the development.

The site in the area of the building appears to be generally flat, although there is a level difference of approximately 1.3m through the building. Atkins has carried out an analysis of the cut and fill volumes that would be required to achieve the appropriate finished floor level within the building. As a result of this analysis, a level has been proposed that will generate a small surplus of excavated material. It would therefore be unlikely that material would have to be imported to create the engineered levels on the site.

Surplus topsoil and chalk materials are to be temporarily stockpiled on site prior to use on further landscaping schemes on the wider site.

1. Introduction

This document has been prepared to provide information concerning the earthworks that will be required to be constructed as a part of the Building ONE project on land at the Science Museum Group at Wroughton (SMGW).

The SMGW occupies a former RAF airfield base in Wiltshire, which uses the former aircraft hangars for storing objects in their collection. It is proposed to construct a large portal framed unit of approximate size 27,000m² to accommodate the collection within a single building. The development will be sited in the northern half of the SMG's site will occupy a parcel of managed grassland located between the taxiways and runways.

The building shall be accessible by large delivery vehicles that will reverse into the building. Level access is therefore essential between existing hardstanding and the new facility.

2. Existing Site Conditions

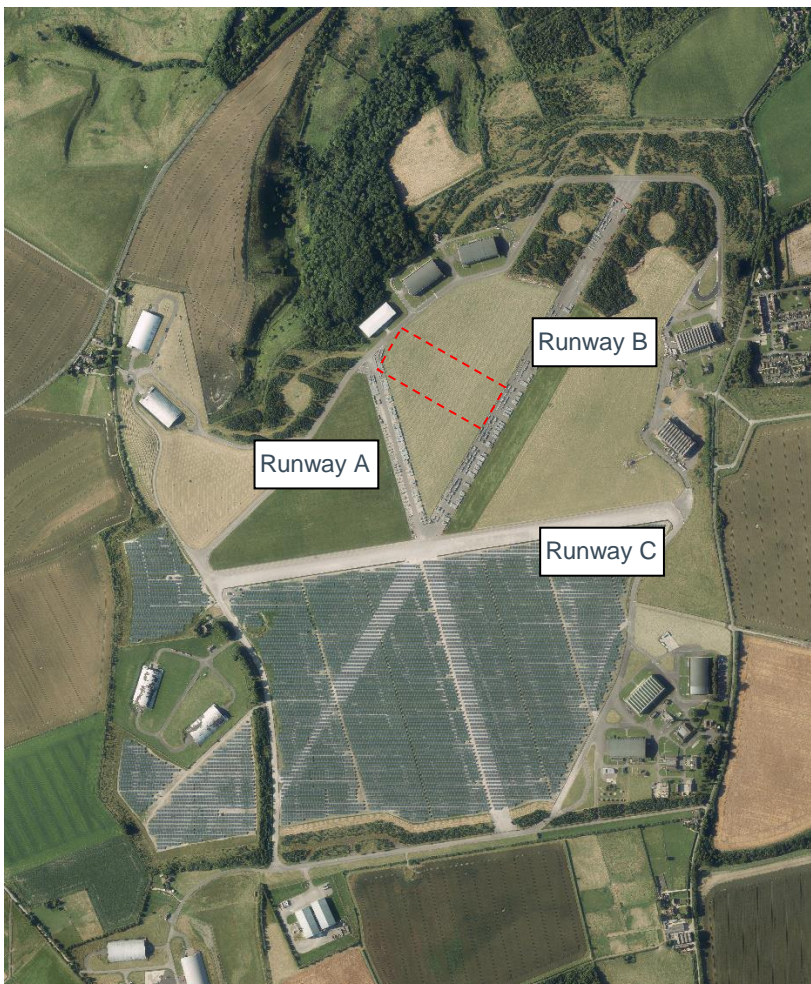
2.1. General

The SMGW uses the former aircraft hangars for storing objects in their collection. SMGW is divided by 3 runways, running on axes approximate north/south (runway A), east/west (runway C) and south west/north east alignments (runway B), shown in the figure below. The runways bisect centrally on the airfield. The development footprint of Building ONE is located in the northern half of SMG's site and occupies a parcel of managed grassland located between the taxiways and runways.

Since 2015, the southern half of the wider SMGW site has housed the Swindon Solar Farm. The 2014 Public Inquiry for the solar park confirm the PDL status of the entire planning unit whereby the Inspector and the Secretary of State for DCLG both agreed that the entire curtilage of the previously developed land extends out to the perimeter fencing of the unit and includes the grasslands in between the former runways and taxiways. The Secretary of State decision also specified that the improved grasslands within the site cannot be regarded, in its own rights, to have a high environmental value

Fig 2.1 below indicates the proposed location of Building ONE, but does not show Solar Farm.

Figure 2-1 Existing Site Layout



2.2. Topography

The topography of SMGW trends from high levels on the western boundary to lower levels near the hangars in the south east corner.

A topographical survey of the Building ONE site area north of runway B was carried out by SUMO Services Ltd in October 2017. The topographical survey is included elsewhere within the planning application documents.

The proposed site area varies in level as follows in a clockwise direction 195.1, 194.6, 196.5, 196.4. For vehicle access, the tie in to runway B would require a finished floor level of approximately **195.500m** to be achieved. The levels vary in generally linear fashion from the higher south west elevation through to the north east elevation, but also fall in a north/south direction.

2.3. Site Geology

Atkins have prepared a Phase 1 Geotechnical and Geo-environmental Desktop study of the site providing information concerning the site history, likely geology and potential sources of contamination. An intrusive site investigation of the airfield is being undertaken for the project.

- Document reference 5161116-ATK-ZZ-XX-RP-G-102

From published sources of information, the geology is understood to comprise topsoil directly overlying chalk material. Site observations do not lead us to believe that significant volumes of made ground could be expected.

Though there are potential sources of contamination identified, it is considered that the material is not suspected of containing contamination that would warrant the preparation of a remediation plan, treatment or off site disposal.

2.4. Archaeology

The site is known to have archaeological interest and has been previously investigated. In consideration of the Building ONE project a geophysical survey has been commissioned for the purpose of archaeological assessment. An archaeological assessment report shall be submitted separately.

2.5. Flora & Fauna

The proposed location of the building is within a managed grassland area at SMGW. Atkins have conducted a preliminary engineering walkover survey of the site that did not observe any flora or fauna that would warrant consideration within the earthworks strategy for the site. Reference should be made to the ecology report submitted separately.

3. Finished Floor Level

The building setting out has been proposed by GWP Architects to use runway B as the primary access point for vehicles and personnel.

To consider the optimum finished floor level we have carried out several analyses of the cut/fill volumes that are likely to be associated with the construction of the building. Ideally, the volume of cut and fill would balance, however this is not always practical.

In consideration of our study, the following assumptions have been made.

- The topsoil/subsoil is 350mm thick uniformly across the site, and that it is not suitable as a fill material. Regardless of the finished level of the building, the topsoil shall be fully removed from the building footprint.
- The proposed ground slab is 200mm thick, and shall be supported on a subbase not greater than 200mm material.
- The building area considered has been increased by a 10m width along 2 of the elevations (south west and the north east to allow for vehicle/maintenance access strip and the proposed plant structure.
- Chalk material excavated from the site is suitable for reuse as a fill material.
- Levels along the existing runway may be modified locally to the building to suit the finished floor level.

Exclusions

- The volume of excavations for foundations, drainage etc are excluded from the current study.
- Bulking factors for materials are assumed to be 1.0, i.e. no account of bulking has been included.

In the scenarios presented below, the volume of topsoil is excluded from the cut figure, but totals circa 9,000m³.

Cut and Fill Exercise

The drawings attached to this report, appendix A, have been developed as a result of the analysis exercise summarised below based on the 27,000m² building with access strips to the side of the building.

Table 3-1 Cut & Fill Summary

Option	Proposed FFL	Cut Volume (m ³)	Fill Volume (m ³)	Net (m ³)	Ranking
1	195.300	13,672	6,339	7,333 Cut	4
2	195.400	11,221	7,481	3,739 Cut	3
3	195.500	8,893	8,417	475 Cut	1
4	195.600	6,858	10,472	3,548 Fill	2
5	195.700	5,009	12,209	7,199 Fill	5

In consideration of the above, the optimum balance of cut and fill can be seen as being closer to 195.500 than 195.600, not accounting for bulking factors etc. For practical purposes, **a proposed level of 195.550 will be appropriate.**

Considering the larger footprint of the building, and setting the FFL at 195.550, the cut/fill balance translates to the following volumes of materials.

Table 3-2 Cut & Fill Summary

Footprint	FFL	Cut Volume (m ³)	Fill Volume (m ³)	Net (m ³)
27,000	195.550	8,472	7,841	631 Cut

Discussion

In consideration of the above, a proposed finished floor level of 195.550 would appear to offer a practical and optimum solution between cut and fill. Bulking factors and the true thickness of topsoil would need to be factored into a final assessment of material volumes.

4. Earthworks Strategy

4.1. General

In consideration of the project and the finished floor level proposed the cut and fill exercise indicates that a reasonably balanced situation could be achieved that would limit imported or exported material movements. The strategy for the site earthworks may be summarised by the following.

The earthworks strategy is shown on our drawing 5161116-ATK-ZZ-ZZ-C-DR-0100

- Topsoil removal and temporary stockpile on site. The stockpile shall not be greater than 3m in height to retain the quality of the material and is likely to be 9,000m³ in volume that would occupy an approximate footprint of 50m x 60m.
- The construction work would utilise standard construction plant (360° excavators up to 30t and 40t dump trucks). It is unlikely that crushing plant will be required.
- The existing chalk sub strata would be excavated for both local ground level reduction, foundations and associated drainage and used as a structural fill material across the building's footprint. The cut and fill exercise carried out above demonstrates that the site is likely to require a small amount of fill material to be imported (before considering additional excavation for drainage and foundations) for Phase 1. However on completion of the foundation and drainage works, there is likely to be a surplus of chalk material remaining. The surplus would be stockpiled local to the building site for re-use.
- Ground Levels beyond the footprint of the development will be adjusted to create slopes not greater than 1 in 3 to tie the areas together. Slope length is unlikely to exceed 5m.
- The desktop report indicates that there are some potential sources of contamination and that these are to be investigated further. In the event that contamination is discovered a site remediation report will be required to propose suitable works to minimise risks to site workers, end users and the environment.
- Subbase material is likely to be imported to the site to be placed between the chalk and concrete floor slab.

4.2. Temporary Stockpiles

It will be necessary to temporarily stockpile material for re-use across the site within landscaping schemes. Drawing 5161116-ATK-ZZ-ZZ-C-DR-0010 and 5161116-ATK-ZZ-ZZ-C-DR-0011 indicates the proposed stockpile locations.

<...end...>

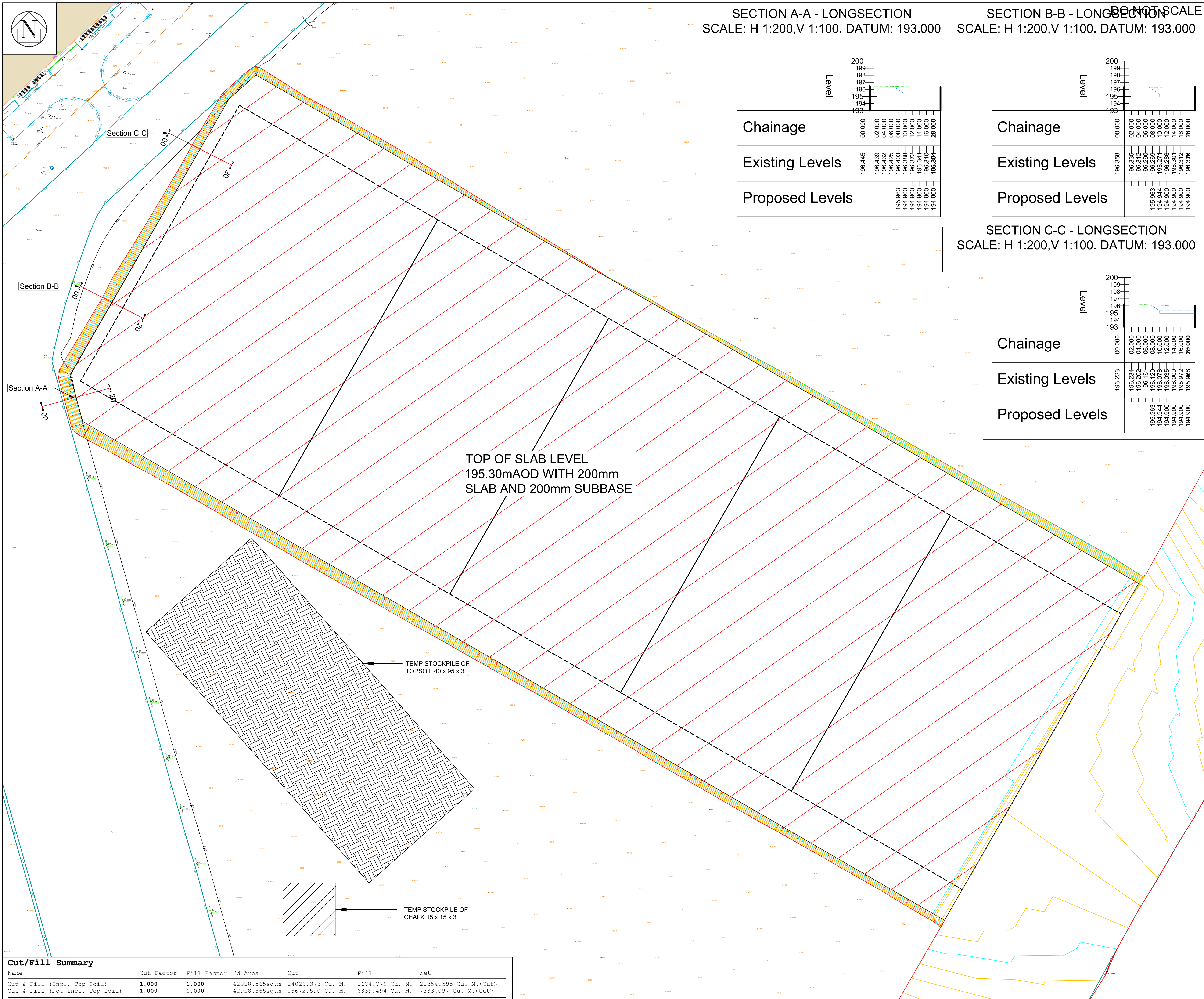
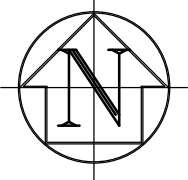
Appendices



Appendix A. Cut & Fill Drawings

- 5161116-ATK-ZZ-ZZ-C-DR-0001
- 5161116-ATK-ZZ-ZZ-C-DR-0002
- 5161116-ATK-ZZ-ZZ-C-DR-0003
- 5161116-ATK-ZZ-ZZ-C-DR-0004
- 5161116-ATK-ZZ-ZZ-C-DR-0005

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Millimetres



SECTION A-A - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

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Existing Levels	196.445	196.439	196.432	196.425	196.403	196.388	196.372	196.341	196.310	196.304	196.304
Proposed Levels		195.963	194.900	194.900	194.900	194.900	194.900	194.900	194.900	194.900	194.900

SECTION B-B - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.356	196.335	196.312	196.290	196.269	196.271	196.286	196.286	196.310	196.310	196.326
Proposed Levels		195.963	194.944	194.900	194.900	194.900	194.900	194.900	194.900	194.900	194.900

SECTION C-C - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.223	196.234	196.202	196.161	196.120	196.078	196.035	195.990	195.970	195.970	195.966
Proposed Levels		195.963	194.944	194.900	194.900	194.900	194.900	194.900	194.900	194.900	194.900

SAFETY, HEALTH AND ENVIRONMENTAL
INFORMATION

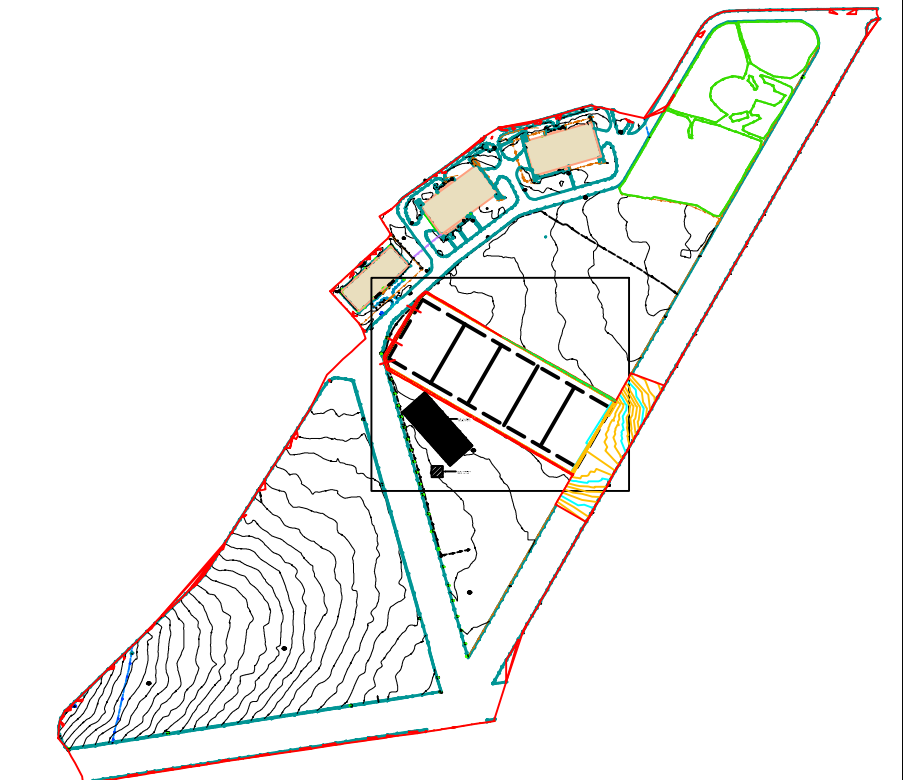
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- KEY:
- SLAB LEVEL (195.55m AOD)
 - EXISTING GROUND LEVEL
 - PROPOSED GRADING AND SUB SURFACE LEVEL

P01	14/12/2017	FOR INFORMATION		BW	AW	AW
Rev.	Date	Description		By	Chkd	App'd

Drawing Status	Suitability
FIT FOR INFORMATION	S2

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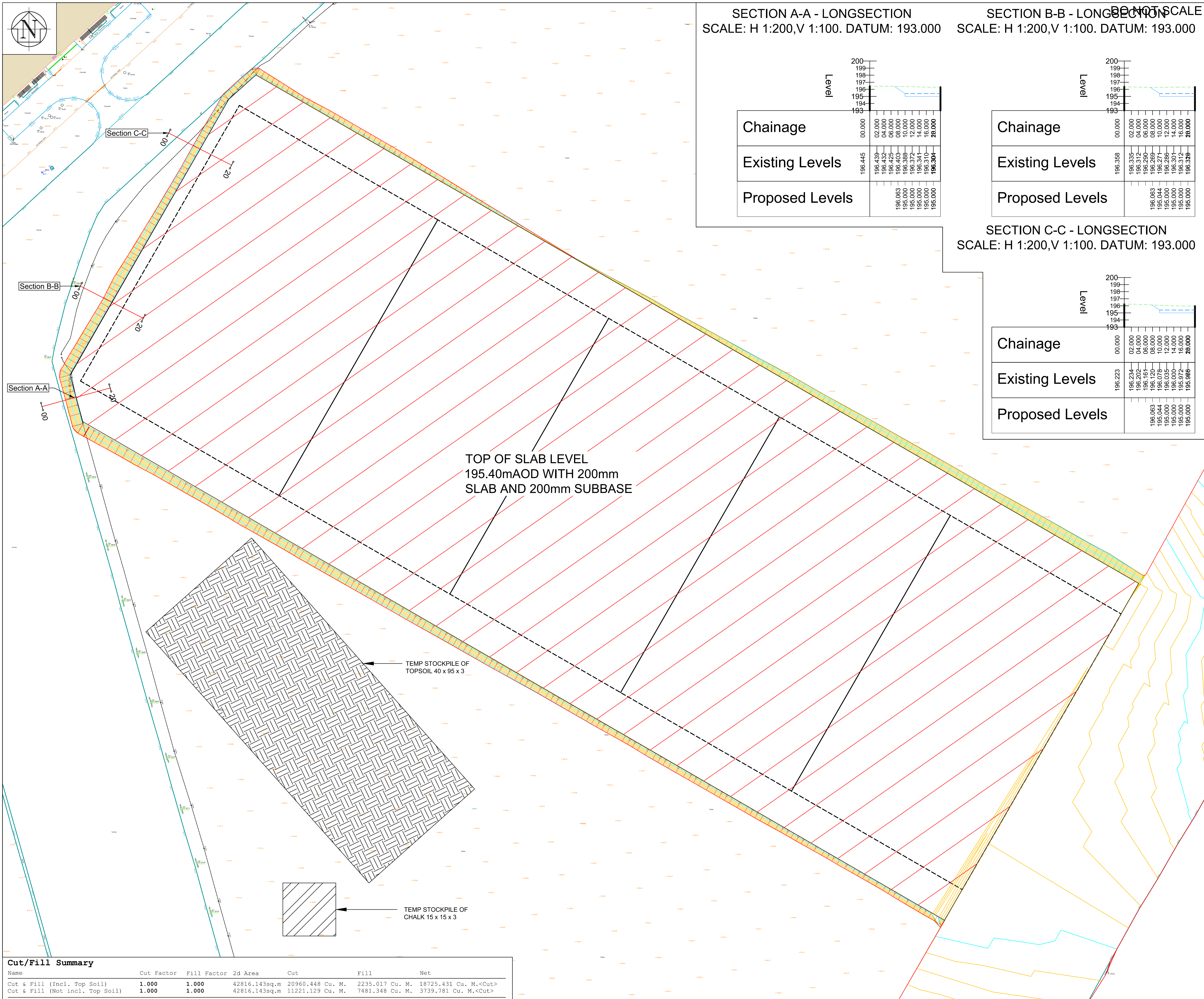
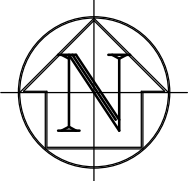
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FFL 195.30m AOD**

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Drawing Number 5161116_ATK_ZZ_ZZ_C_DR_XXXX	Revision P01
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SECTION A-A - LONGSECTION
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Proposed Levels		196.063	195.000	195.000	195.000	195.000	195.000	195.000	195.000	195.000	195.000

SECTION B-B - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.356	196.335	196.312	196.290	196.269	196.271	196.286	196.280	196.301	196.304	196.326
Proposed Levels		196.063	195.004	195.000	195.000	195.000	195.000	195.000	195.000	195.000	195.000

SECTION C-C - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.223	196.234	196.202	196.161	196.120	196.078	196.035	195.000	195.000	195.000	195.966
Proposed Levels		196.063	195.044	195.000	195.000	195.000	195.000	195.000	195.000	195.000	195.000

SAFETY, HEALTH AND ENVIRONMENTAL
INFORMATION

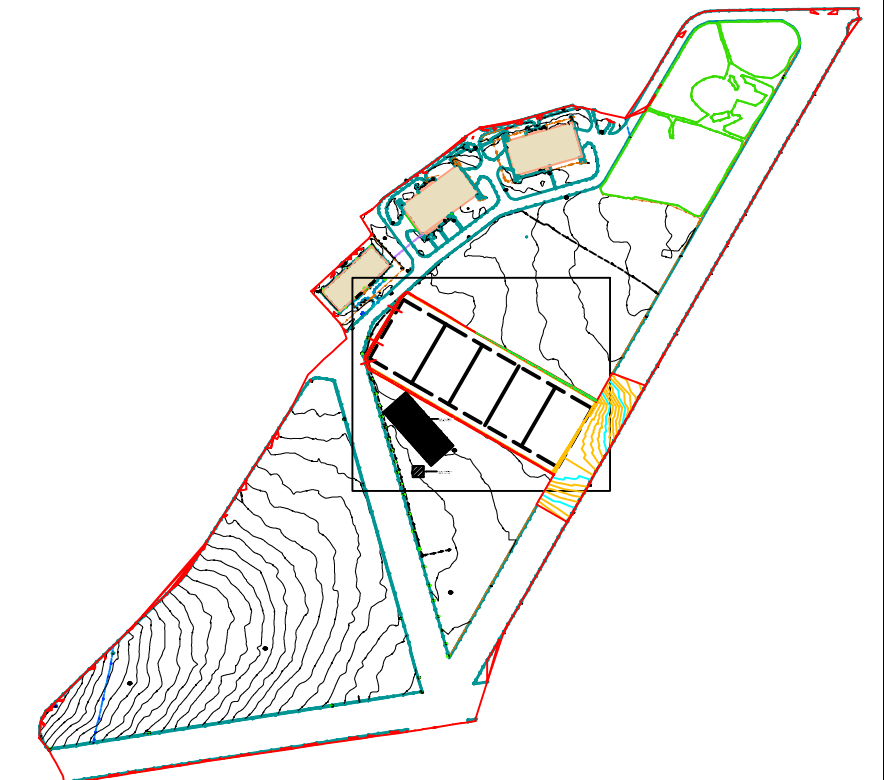
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- KEY:
- SLAB LEVEL (195.55m AOD)
 - EXISTING GROUND LEVEL
 - PROPOSED GRADING AND SUB SURFACE LEVEL

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Rev.	Date	Description	By	Chkd	App'd

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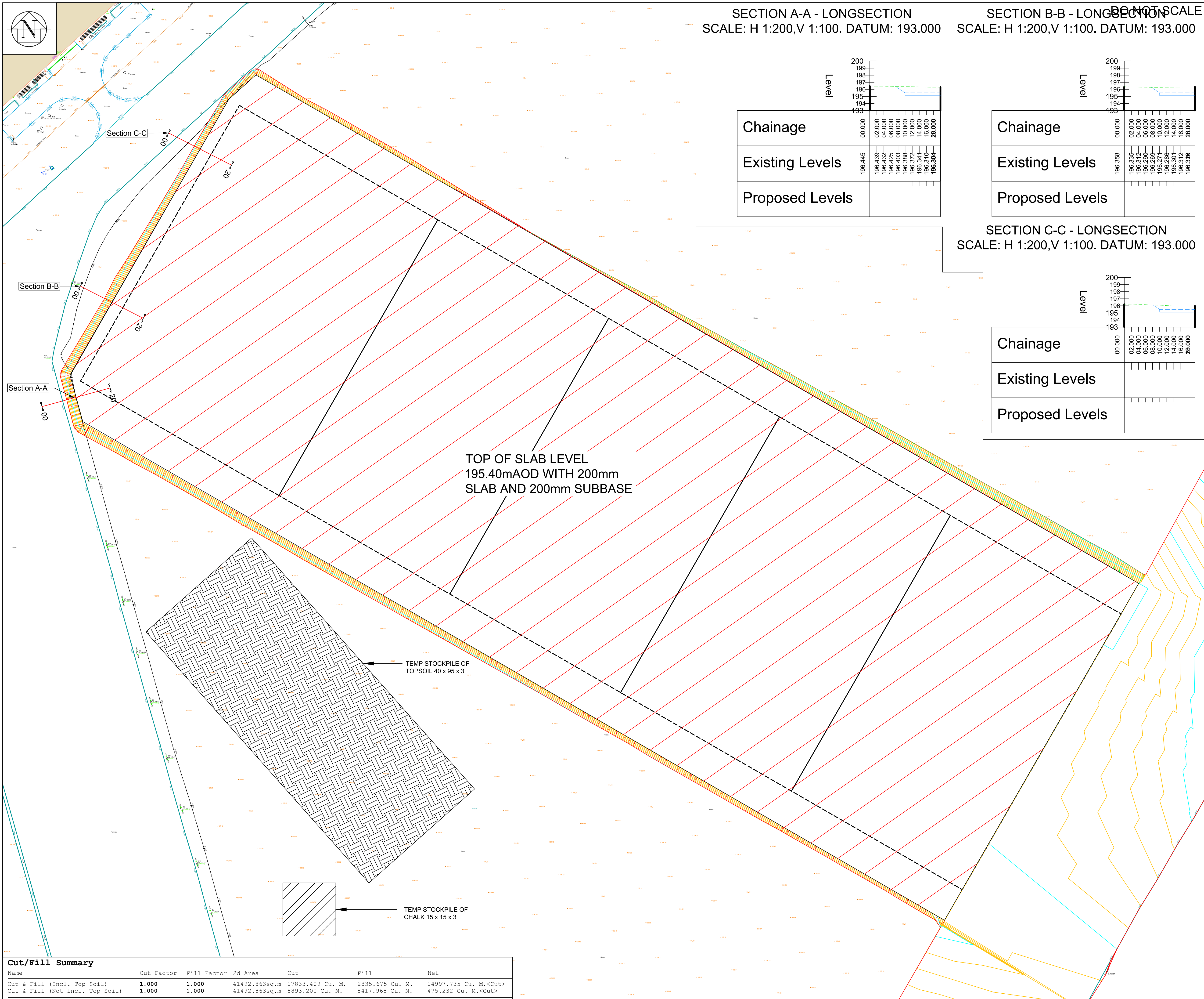
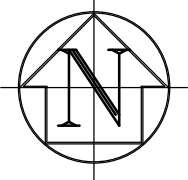
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Drawing Number	Revision
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Cut & Fill (Not incl. Top Soil)	1.000	1.000	42816.143sq.m	11221.129 Cu. M.	7481.348 Cu. M.

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Millimetres



SECTION A-A - LONGSECTION
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Proposed Levels											

SECTION B-B - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.356	196.335	196.312	196.290	196.269	196.271	196.286	196.301	196.310	196.310	196.326
Proposed Levels											

SECTION C-C - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels											
Proposed Levels											

SAFETY, HEALTH AND ENVIRONMENTAL
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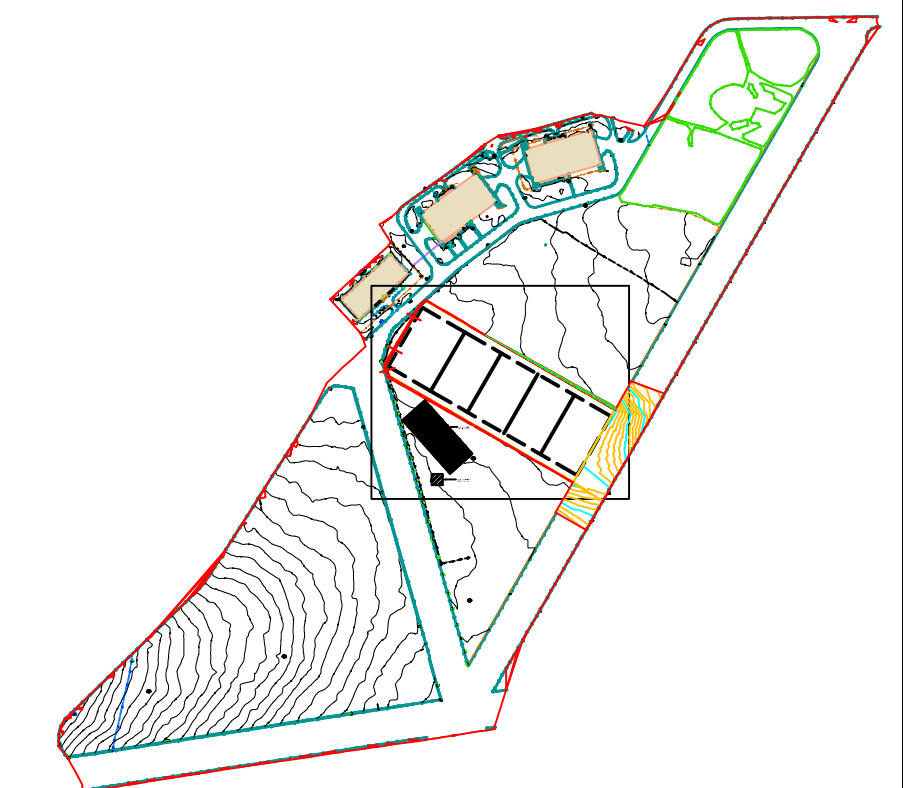
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 - EXISTING GROUND LEVEL
 - PROPOSED GRADING AND SUB SURFACE LEVEL

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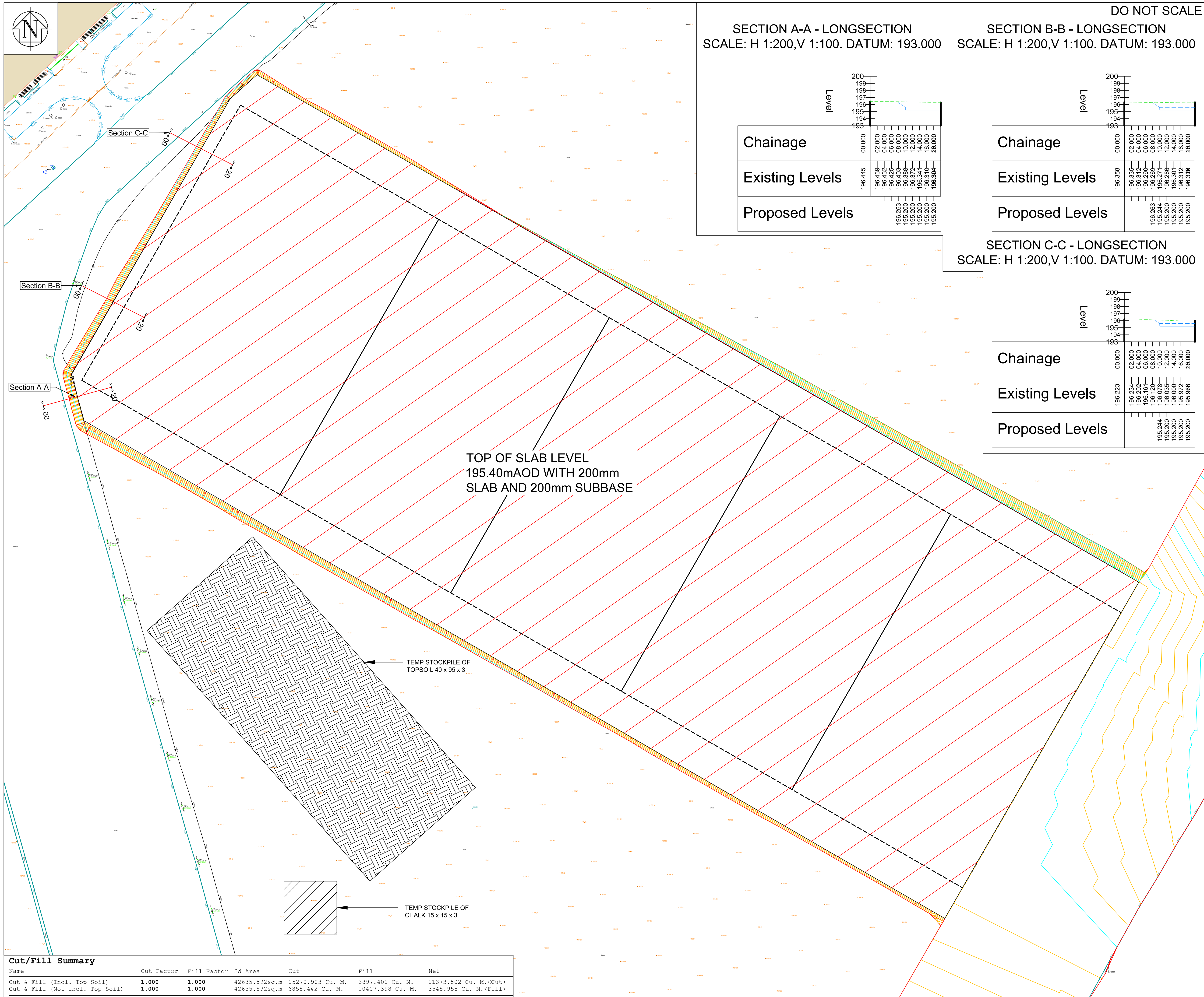
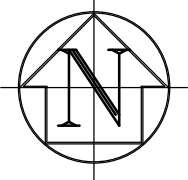
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Original Size	Date	Date	Date	Date
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Drawing Number	Revision
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Millimetres



SECTION A-A - LONGSECTION
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Proposed Levels		196.263	195.200	195.200	195.200	195.200	195.200	195.200	195.200	195.200	195.200

SECTION B-B - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.358	196.335	196.312	196.290	196.269	196.271	196.286	196.280	196.312	196.312	196.326
Proposed Levels		196.263	195.244	195.200	195.200	195.200	195.200	195.200	195.200	195.200	195.200

SECTION C-C - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.223	196.234	196.202	196.161	196.120	196.078	196.035	195.992	195.950	195.986	195.986
Proposed Levels		195.244	195.200	195.200	195.200	195.200	195.200	195.200	195.200	195.200	195.200

SAFETY, HEALTH AND ENVIRONMENTAL
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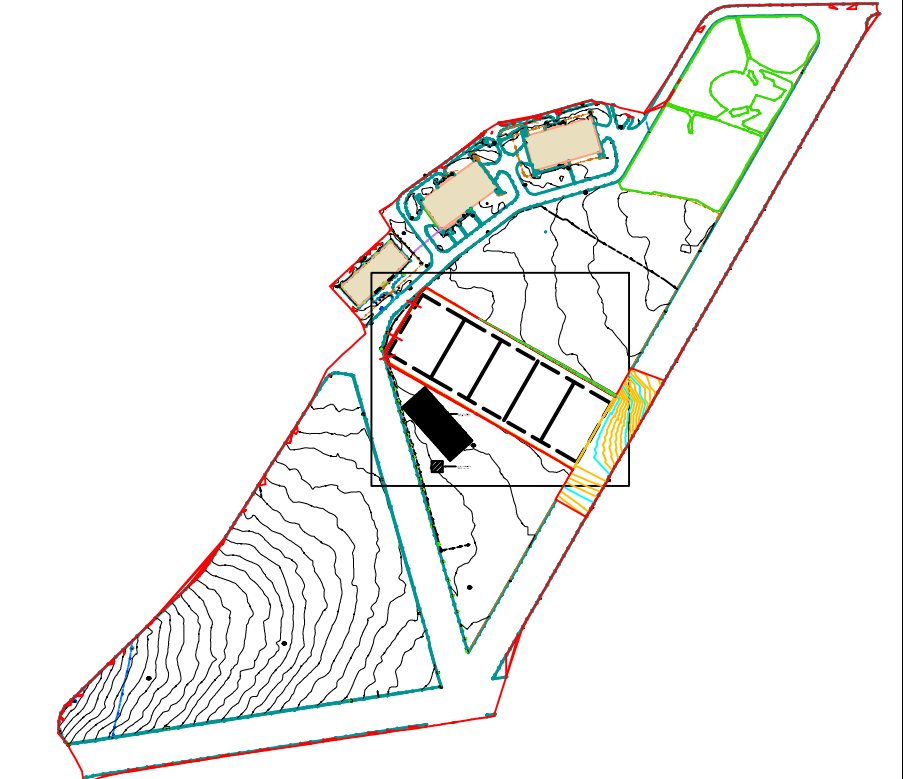
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 - EXISTING GROUND LEVEL
 - PROPOSED GRADING AND SUB SURFACE LEVEL

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Rev.	Date	Description	By	Chkd	App'd

Drawing Status	Suitability
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Project Title
**ONE SCIENCE COLLECTION
WROUGHTON**

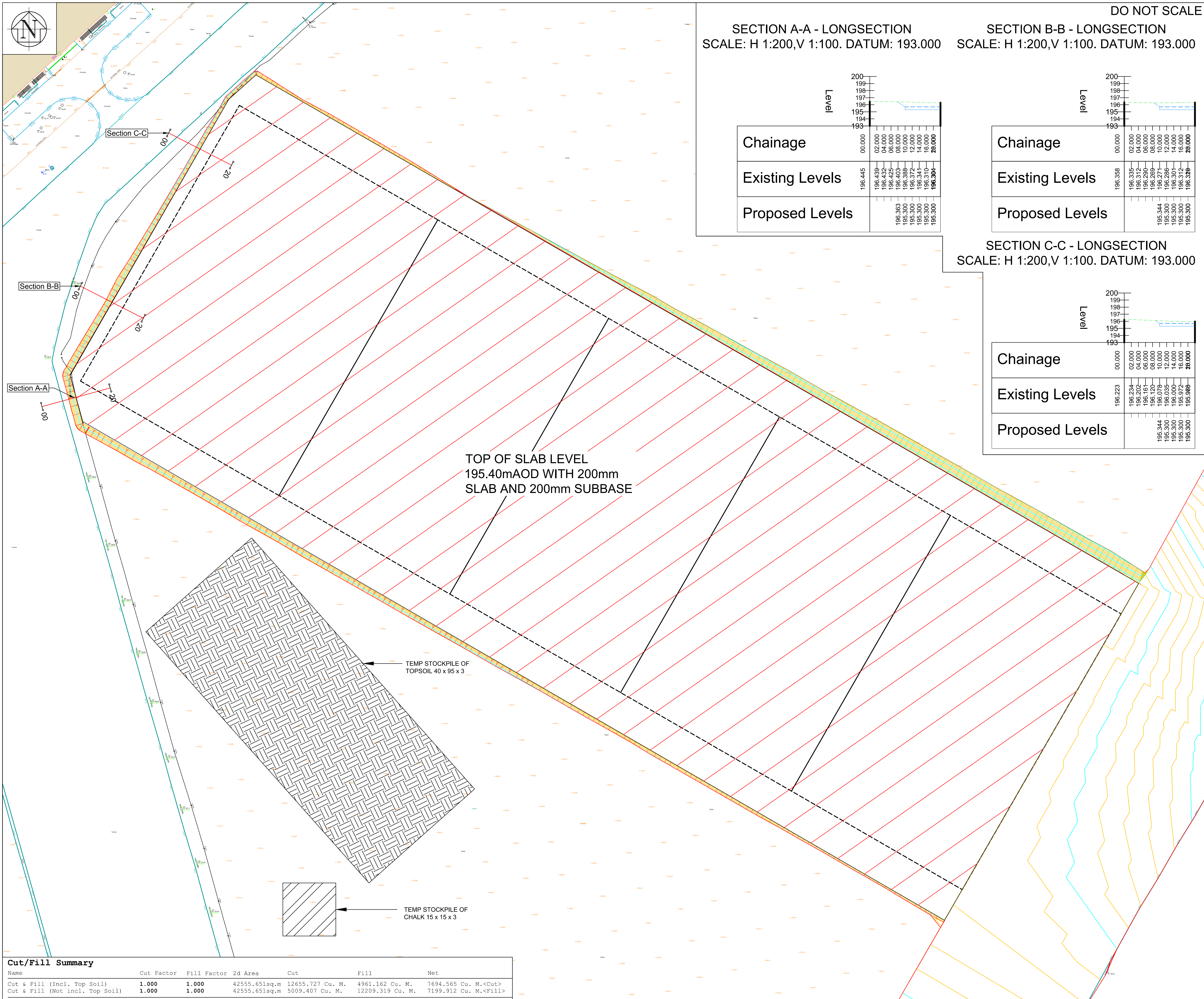
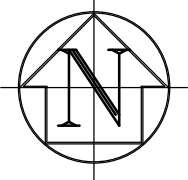
Drawing Title
**EARTHWORKS STRATEGY
FFL 195.60m AOD**

Scale 1:500	Designed BW	Drawn BW	Checked AW	Authorised AW
Original Size A1	Date 15/11/17	Date 15/11/17	Date 15/11/17	Date 15/11/17

Drawing Number 5161116_ATK_ZZ_ZZ_C_DR_XXXX	Revision P01
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Cut/Fill Summary						
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Cut & Fill (Incl. Top Soil)	1.000	1.000	42635.592sq.m	15270.903 Cu. M.	3897.401 Cu. M.	11373.502 Cu. M.<Cut>
Cut & Fill (Not incl. Top Soil)	1.000	1.000	42635.592sq.m	6858.442 Cu. M.	10407.398 Cu. M.	3548.955 Cu. M.<Fill>

0 10 100
Millimetres



SECTION A-A - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.445	196.439	196.432	196.425	196.403	196.388	196.372	196.341	196.310	196.304	196.304
Proposed Levels		196.363	195.300	195.300	195.300	195.300	195.300	195.300	195.300	195.300	195.300

SECTION B-B - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.358	196.335	196.312	196.290	196.269	196.271	196.286	196.300	196.312	196.312	196.312
Proposed Levels		195.344	195.300	195.300	195.300	195.300	195.300	195.300	195.300	195.300	195.300

SECTION C-C - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 193.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.223	196.234	196.202	196.161	196.120	196.078	196.035	195.992	195.950	195.908	195.866
Proposed Levels		195.344	195.300	195.300	195.300	195.300	195.300	195.300	195.300	195.300	195.300

SAFETY, HEALTH AND ENVIRONMENTAL
INFORMATION

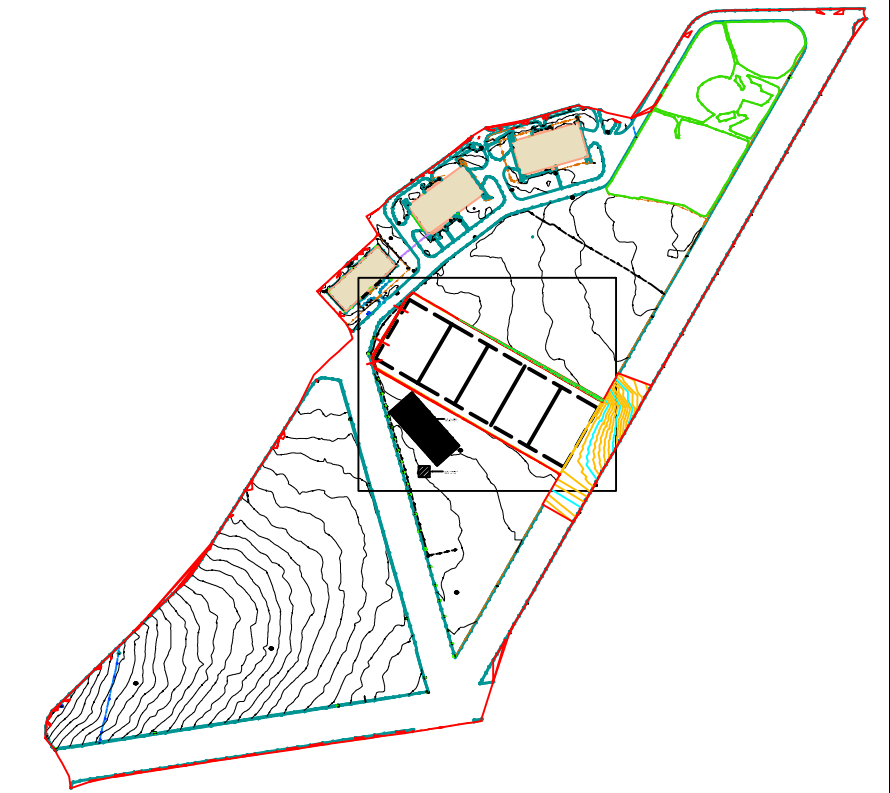
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

MAINTENANCE/CLEANING

DECOMMISSIONING/DEMOLITION

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement



- KEY:
- SLAB LEVEL (195.55m AOD)
 - EXISTING GROUND LEVEL
 - PROPOSED GRADING AND SUB SURFACE LEVEL

P01	14/12/2017	FOR INFORMATION	BW	AW	AW
Rev.	Date	Description	By	Chkd	App'd

Drawing Status	Suitability
FIT FOR INFORMATION	S2

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Client
**SCIENCE
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GROUP**

Project Title
**ONE SCIENCE COLLECTION
WROUGHTON**

Drawing Title
**EARTHWORKS STRATEGY
FFL 195.70m AOD**

Scale 1:500	Designed BW	Drawn BW	Checked AW	Authorised AW
Original Size A1	Date 15/11/17	Date 15/11/17	Date 15/11/17	Date 15/11/17

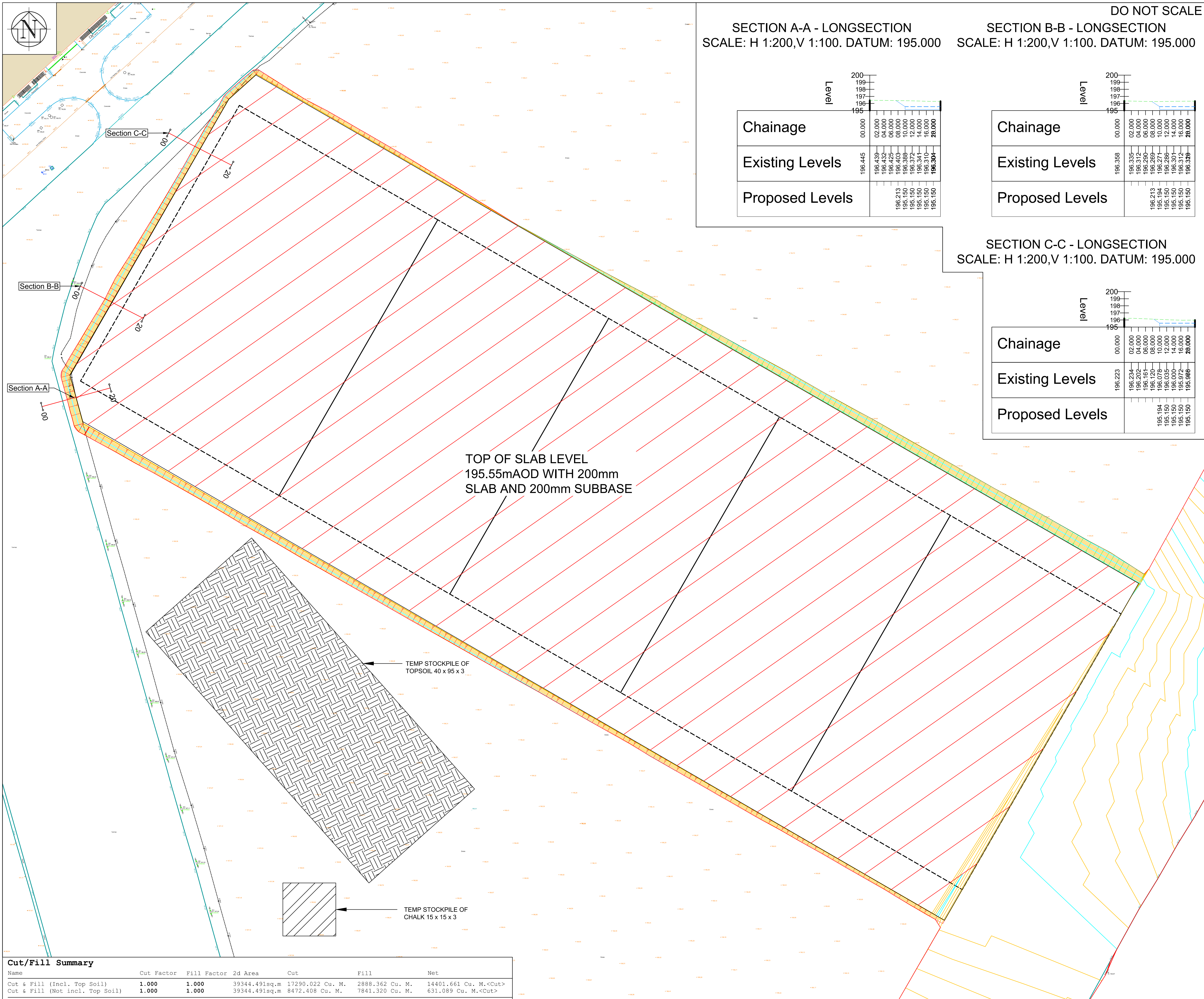
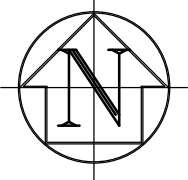
Drawing Number 5161116_ATK_ZZ_ZZ_C_DR_XXXX	Revision P01
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Cut/Fill Summary						
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Cut & Fill (Incl. Top Soil)	1.000	1.000	42555.651sq.m	12655.727 Cu. M.	4961.162 Cu. M.	7694.565 Cu. M.<Cut>
Cut & Fill (Not incl. Top Soil)	1.000	1.000	42555.651sq.m	5009.407 Cu. M.	12209.319 Cu. M.	7199.912 Cu. M.<Fill>

Appendix B. Earthworks Drawings

- 5161116-ATK-ZZ-ZZ-C-DR-0011

0 10 100
Millimetres



SECTION A-A - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 195.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.445	196.439	196.432	196.425	196.403	196.388	196.372	196.341	196.310	196.304	196.304
Proposed Levels		196.213	195.150	195.150	195.150	195.150	195.150	195.150	195.150	195.150	195.150

SECTION B-B - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 195.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.356	196.335	196.312	196.290	196.269	196.271	196.286	196.280	196.310	196.326	196.326
Proposed Levels		196.213	195.194	195.150	195.150	195.150	195.150	195.150	195.150	195.150	195.150

SECTION C-C - LONGSECTION
SCALE: H 1:200,V 1:100. DATUM: 195.000

Chainage	00.000	02.000	04.000	06.000	08.000	10.000	12.000	14.000	16.000	18.000	20.000
Existing Levels	196.223	196.234	196.202	196.161	196.120	196.078	196.035	195.970	195.920	195.906	195.906
Proposed Levels		195.194	195.150	195.150	195.150	195.150	195.150	195.150	195.150	195.150	195.150

SAFETY, HEALTH AND ENVIRONMENTAL
INFORMATION

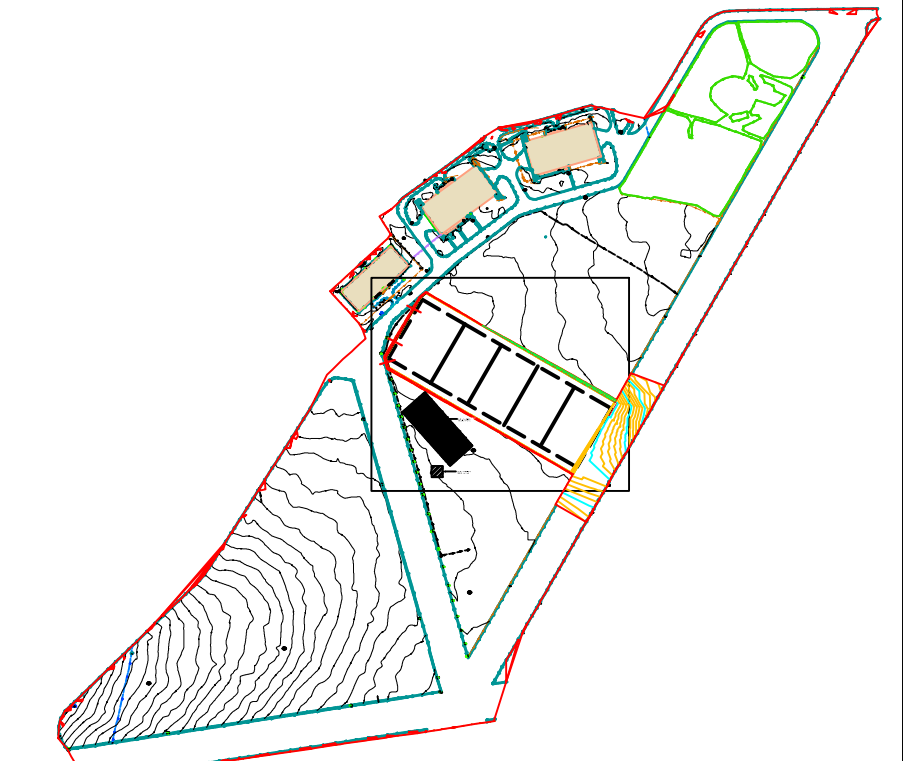
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

MAINTENANCE/CLEANING

DECOMMISSIONING/DEMOLITION

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement



- KEY:
- SLAB LEVEL (195.55m AOD)
 - EXISTING GROUND LEVEL
 - PROPOSED GRADING AND SUB SURFACE LEVEL

P01	04/12/2017	FOR INFORMATION	BW	AW	AW
Rev.	Date	Description	By	Chkd	App'd

Drawing Status	Suitability
FIT FOR INFORMATION	S2

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**SCIENCE
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Project Title
**ONE SCIENCE COLLECTION
WROUGHTON**

Drawing Title
**EARTHWORKS STRATEGY
FFL 195.55m AOD**

Scale 1:500	Designed BW	Drawn BW	Checked AW	Authorised AW
Original Size A1	Date 15/11/17	Date 15/11/17	Date 15/11/17	Date 15/11/17

Drawing Number 5161116_ATK_ZZ_ZZ_C_DR_0011	Revision P01
--	------------------------

Cut/Fill Summary						
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Cut & Fill (Incl. Top Soil)	1.000	1.000	39344.491sq.m	17290.022 Cu. M.	2888.362 Cu. M.	14401.661 Cu. M.<Cut>
Cut & Fill (Not incl. Top Soil)	1.000	1.000	39344.491sq.m	8472.408 Cu. M.	7841.320 Cu. M.	631.089 Cu. M.<Cut>

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