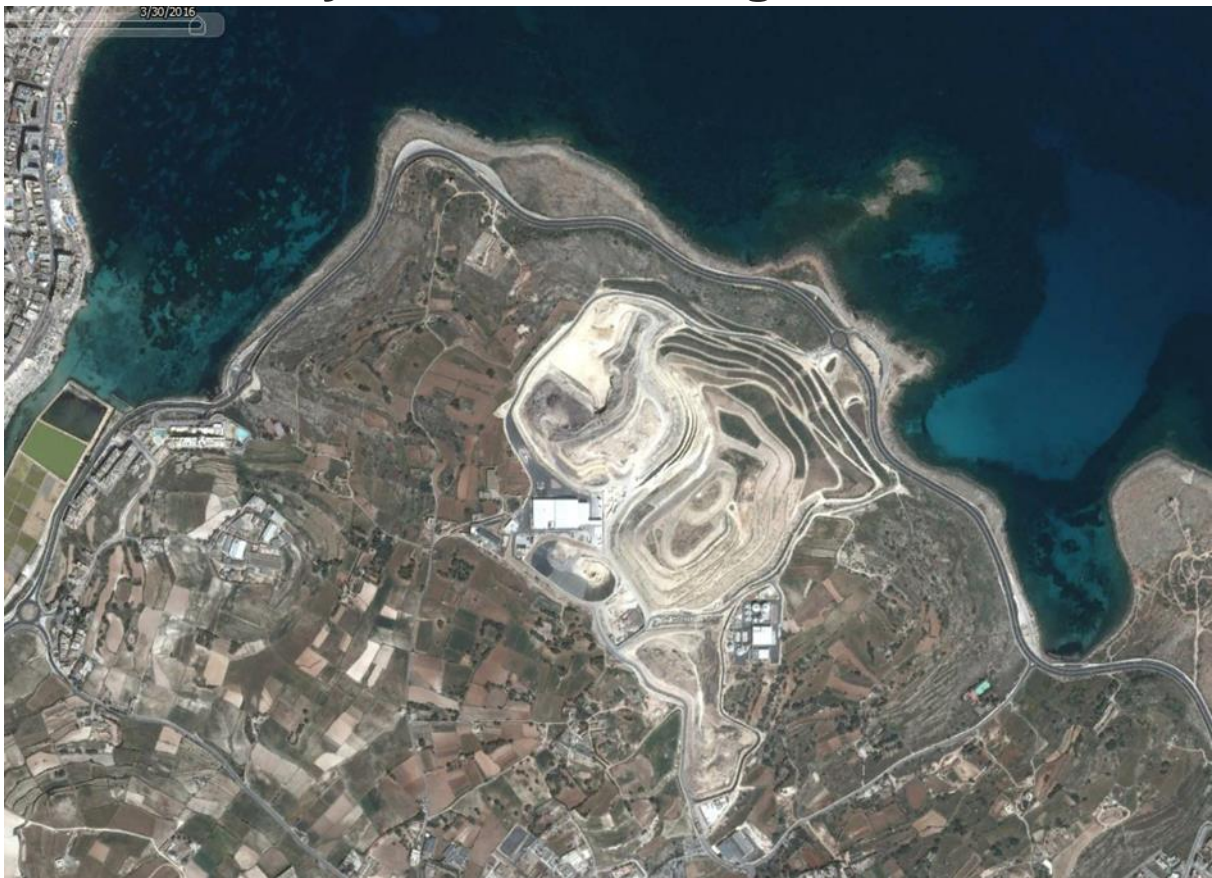


Project Description Statement

PA 03144/19: Proposed conversion of an un-used existing hazardous cell into non-hazardous cell, including extension of cell boundary and sanctioning of excavation.



@econsulting has prepared this report for the sole use of Wasteserv Company Ltd.; the contents of this report are based primarily upon information provided by the client, and such information has not been independently verified unless explicitly stated. Such information provides the basis for any conclusions and recommendations included in this document, which are not to be construed as legal or tax advice, and which are to be considered in the context within which the entire document was prepared. No liability is accepted for the use of this document other than the purposes for which it was drafted.

Cover image from Google Earth (2017)

Introduction

1. Wasteserv Malta Ltd. has submitted a development permit application PA 03144/19 titled '*Proposed conversion of an un-used existing hazardous cell into non-hazardous cell, including extension of cell boundary and sanctioning of excavation*'. The scope of this application is the conversion and extension of the hazardous landfill within the confines of the Maghtab Environmental Complex (approved through PA 4834/04) to a non-hazardous cell, and the continued excavation (and sanctioning) of the south-eastern end of the existing hazardous cell.
2. The limited void space remaining at the Ghallis non-hazardous landfill is the most significant waste management issue at the national level. This facility is the only disposal option – barring export at a prohibitive cost – for non-hazardous waste streams where diversion to recovery or recycling is not an option. Remaining approved landfill void space as at March 2017 is estimated¹ at 1,000,000m³. The remaining landfill void space is expected to be filled rapidly, given current waste deposition rates (an average of 21,500 tonnes per month during 2016).
3. Effort to increase landfill void space have included PA 01586/18 titled '*To amend permit PA 964/11 and alter the internal lateral landfill profile to increase volume capacity of Ghallies non-hazardous Landfill while retaining site area*', as approved in July 2019. The objective of this application was to introduce specialised engineering techniques to increase the steepness of the profile of the eastern side of the Ghallis landfill, to increase the void space of the landfill. These engineering works shall extend the Ghallis landfill life time by around 9 to 12 months, increasing available void space by circa 315,000m³.
4. The objective of this application is to provide an increased void space for disposal of waste, to accommodate the demand for landfill services for the foreseeable future. The availability of new void space is essential once the void space in the existing landfill facilities is exhausted, and this must be provided in a manner that does not disrupt provision of service. Furthermore, the project must ensure best utilisation of land.

¹ This estimate subtracts the approximate volume occupied by the basal lining layers and assumes a 10% daily cover.

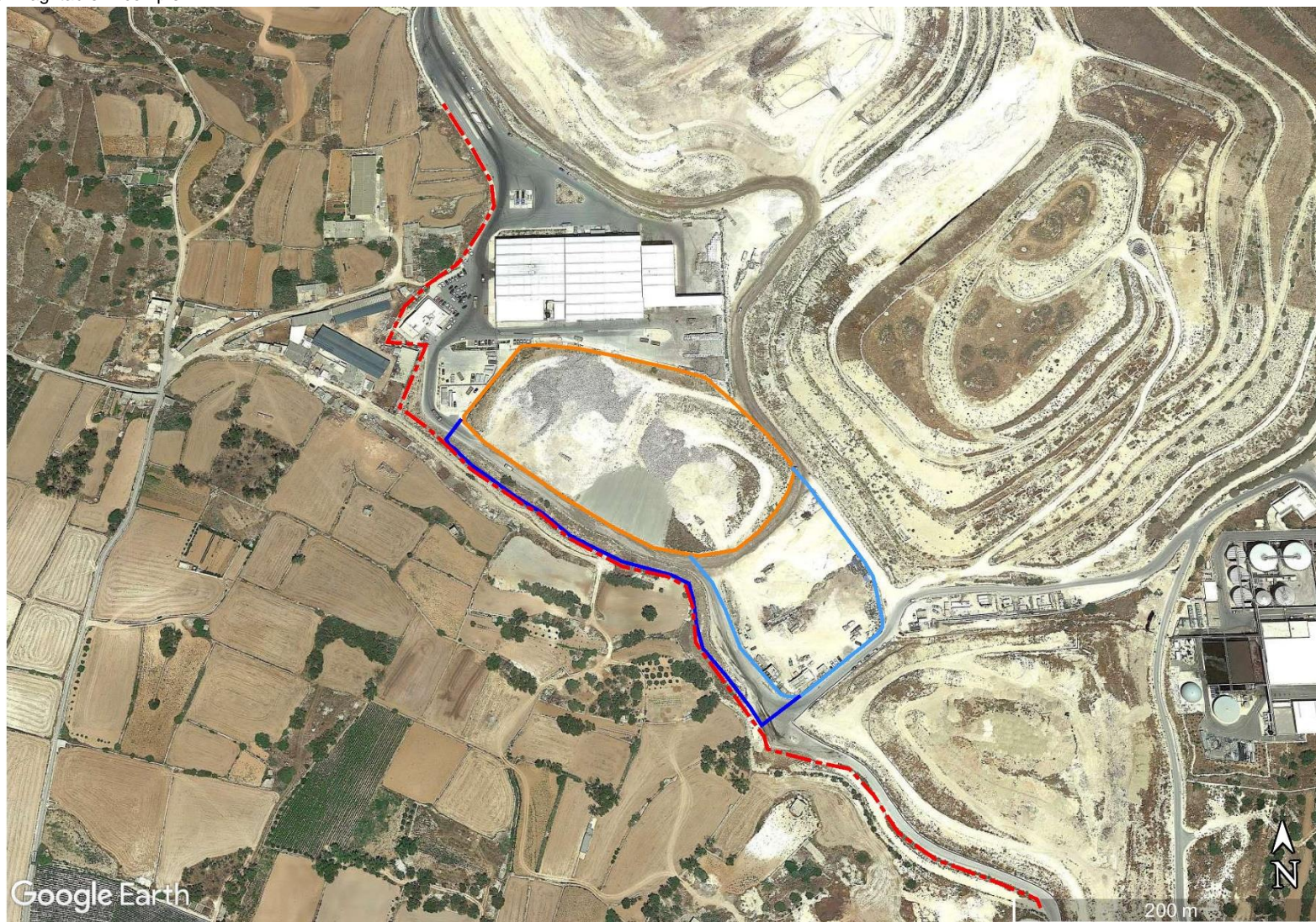
5. The Ghallis landfill currently has a remaining void space of circa 381,000m³, which will last up till end of 2020, depending on the actual rate of landfilling. The additional 9 to 12 months of landfill void space (circa 315,000m³) gained by the recontouring of the eastern side of Ghallis will be utilised concurrently with the Ghallis void space, given that the wastes used in the recontouring must be compatible with the technology utilised in this project.
6. This proposal will result in the creation of an additional waste landfilling volume of circa 1.8 million cubic metres, not including 30,000m³ of baled waste that will be part of the construction process, and does not include the volume of the lining and capping system. The void space that has been gained by extending the boundary of the ex-hazardous cell to south west is just under 1.5 million cubic metres.
7. Alternative disposal technologies such as waste to energy are still under development. To allow for sufficient time to develop such alternative waste disposal options, obtain the required regulatory permits, and construct the required infrastructure, it is imperative that the lifetime of the Ghallis landfill be extended as far as possible. This is essential if alternatives are to be operational before available landfill void space is exhausted.
8. Furthermore, despite the introduction of alternative waste disposal facilities, the requirement for landfill would still remain for those waste streams for which there are no viable recovery or recycling options, that are not suitable for thermal treatment via waste to energy, or that are the non-hazardous output of such technology. In this regard, landfilling is expected to remain a necessary component of the Maltese waste management infrastructure.
9. The hazardous landfill was an approved development that was never put into practice i.e. no hazardous wastes were ever disposed of at this location. Although the cell was excavated and partially lined, landfilling of hazardous wastes was never approved by the competent authorities. The development permitting process of the hazardous cell assumed that hazardous wastes in Malta could be treated and stabilised (chemically and physically) prior to disposal in the hazardous cell. However, this process did not consider the required scale of the treatment facilities, and the issues that would be faced when treating substantial volumes of a large variety of hazardous wastes. In practice, all hazardous wastes destined for landfill post 2004 have been exported, given that local treatment was not an option.
10. Future plans for hazardous waste management in Malta need to consider the current practices for treatment of hazardous wastes in the EU, where specific wastes are managed in a limited number of specialised facilities. Furthermore, the development of the Circular Economy will ultimately be moving towards an eventual hypothetical target for zero landfill of hazardous wastes, with such wastes being returned to productive use as part of the waste management/resource use cycle.

11. Export from Malta of MSW and non-hazardous for landfill has been found to be an expensive and difficult process. Although there are very few landfills in the EU open to accept non-hazardous wastes given the volumes involved, the experience gained since 2004 has indicated that this is not the case for export of hazardous wastes for landfill. Given this situation, priority should be given to the urgent need for available landfill void space to be used for the disposal of non-hazardous wastes, rather than reserved for hazardous wastes which are currently being exported.

Plan 1a: location of proposed project in red, with access route indicated in blue.



Plan 1b: location of proposed project: Orange – original cell boundary, Light Blue - extension of ex-hazardous facility, Dark Blue - extension into road to be used for access, Red (Dotted) - boundary of Magtab env complex



Project Context: the Magtab Environmental Complex

12. The Magtab Environmental Complex originally consisted of the old land raise that was developed at Magtab in the 1970s. Increasing environmental awareness and accession of Malta to the European Union resulted in the closure of the Magtab land raise, commencement of the rehabilitation process, and development of new facilities to handle the bulk of the national demand in terms of waste management solutions. The complex currently consists of the following components:

- Northern gate, reception facilities and office complex;
- Internal haul roads;
- Magtab landfill – the dump site created in the 1970s, which has been the target of various measures to secure its rehabilitation;
- Zwejra Landfill – an engineered landfill for the disposal of non-hazardous wastes permitted, developed and commissioned in 2004, immediately on accession to the European Union;
- Ghallis landfill - an engineered landfill facility for the disposal of non-hazardous wastes, originally permitted for operation in 2007;
- An area previously considered for the development of a hazardous landfill, that is currently being used as RDF storage, and being considered for the development of additional non-hazardous landfill capacity;
- Malta North Mechanical Treatment Plant that receives Municipal Solid Waste for separates incoming waste streams into recoverable fractions, and pre-treats rejects prior to landfilling;
- Malta North Bulky Line that separates a range of bulky wastes into recoverable fractions, and pre-treats rejects prior to landfilling;
- Malta North Anaerobic Digestion (AD) plant – a facility for the anaerobic digestion of organic wastes from the MTP, as well as source segregated organic wastes and manure;
- Various ancillary facilities such as a Combined Heat and Power plant used for the treatment of biogas and landfill gases; and
- A Civic Amenity site located just outside the southern gate of the site.

The location of the main facilities outlined above are illustrated in Image 1 overleaf.

Image 1: the Maghtab Environmental Complex: Maghtab landfill rehabilitation and associated lagoons (light blue), Zwejra Landfill (dark blue), hazardous cell (currently used as RDF storage – red), Malta North AD plant (green) and Malta North MTP & Bulky Line (orange). Aerial photo from Google Earth (2008). The area marked in red is equivalent to the full extent of the proposed project.



13. The operational linkages between the various facilities at the Maghtab Environmental Complex are illustrated in Figure 1 overleaf. The latter consists of a high-level description of the waste material flows between the waste management facilities currently present within the Maghtab Environmental Complex. The outputs of the various processes include:

- Energy from biogas treatment;
- Recyclables for export;
- Refuse Derived Fuel (RDF) intended for eventual export;
- Hazardous wastes removed from incoming wastes as part of quarantine operations; and
- Compost, the quality of which is still under evaluation.

However, it should be noted that the bulk of these material flows are still oriented towards landfilling, with circa 30% of Municipal Solid Waste still being landfilled without the benefit of any pre-treatment to recover material or improve compaction at the landfill tip face. Other Wasteserv Malta projects are being commissioned to address this shortfall.

14. The model highlighted in Figure 1 relies heavily on landfilling as the ultimate solution. This issue, together with the shortfall in waste management capacity is also highlighted in the reports prepared by SLR (2015) and JASPERS (2017), whereby various potential investments in operational improvement, as well as potential investment in facilities, are considered. Such gaps in waste management capacity have highlighted the need for the following waste management facilities:

- i. **Multi-Materials Recovery Facility (MMRF)** to facilitate recovery of materials (via diversion from landfill) that can be sent for recycling;
- ii. Additional capacity in terms of **Material Recovery Facilities** to replace destroyed capacity at Sant Antnin, and to facilitate recovery of materials from collection of mixed dry recyclables, that can be sent for recycling;
- iii. Additional capacity in **Civic Amenity sites**, with a particular focus on commercial premises and micro-enterprises;
- iv. A **Waste to Energy plant (WtE)** to facilitate recovery of energy from waste, and reduce volumes of waste sent to landfill; and
- v. Development of additional **landfill** capacity, given the extremely limited void space still available.

15. Figure 2 consists of a high-level description of the optimised process for management of waste streams received by Wasteserv Malta Ltd. at the Maghtab Environmental Complex. Such optimisation (including the introduction of a waste to energy plant) include also the optimisation of existing plant at Malta North, and the introduction of a Material Recovery Facility (relocated from Sant Antnin) to complement existing operations and address current gaps in waste management capacity.

16. The processes being described in figure 2 are currently in different phases of development. Nevertheless, it should be noted that although these reduce the scope for use of landfill, these do not remove the need for this facility as a last resort. Further developments will be required to eliminate the need for landfill in Malta, through the development of further infrastructure for waste treatment, and more critically, the adoption of the circular economy philosophy in the design and production of consumer items.
17. The need to ensure the availability of sufficient landfill void space at the Maghtab Environmental Complex has triggered the development of this proposal, which seeks to optimise land use on site by re-purposing the hazardous cell to a more productive and efficient use, by developing landfill cells using technologies that maximise the scope for gain of void space.
18. Nevertheless, it should be noted that the void space for landfill made available by this project will be finite, and that the potential for future expansion of landfilling activities will be required once this is exhausted. The *Waste Management Plan for the Maltese Islands: A Resource Management Approach (2014 – 2020)* considered the necessity of landfill services up till 2020, and it is likely that the update to this policy document will give further consideration to this issue given the technical limitations that require the retention of landfilling as an ultimate waste management option. Consequently, development of landfill facilities must consider future scope for expansion.
19. This project offers scope for eventual lateral expansion to the west, to accommodate future demand for landfilling. An assessment of future alternatives is provided below; however, regardless of site chosen, eventual developments found to be necessary should consider a phased approach. This would ensure efficient land use, as efficiencies gained in waste management generally would serve to delay the uptake of further land as much as possible.

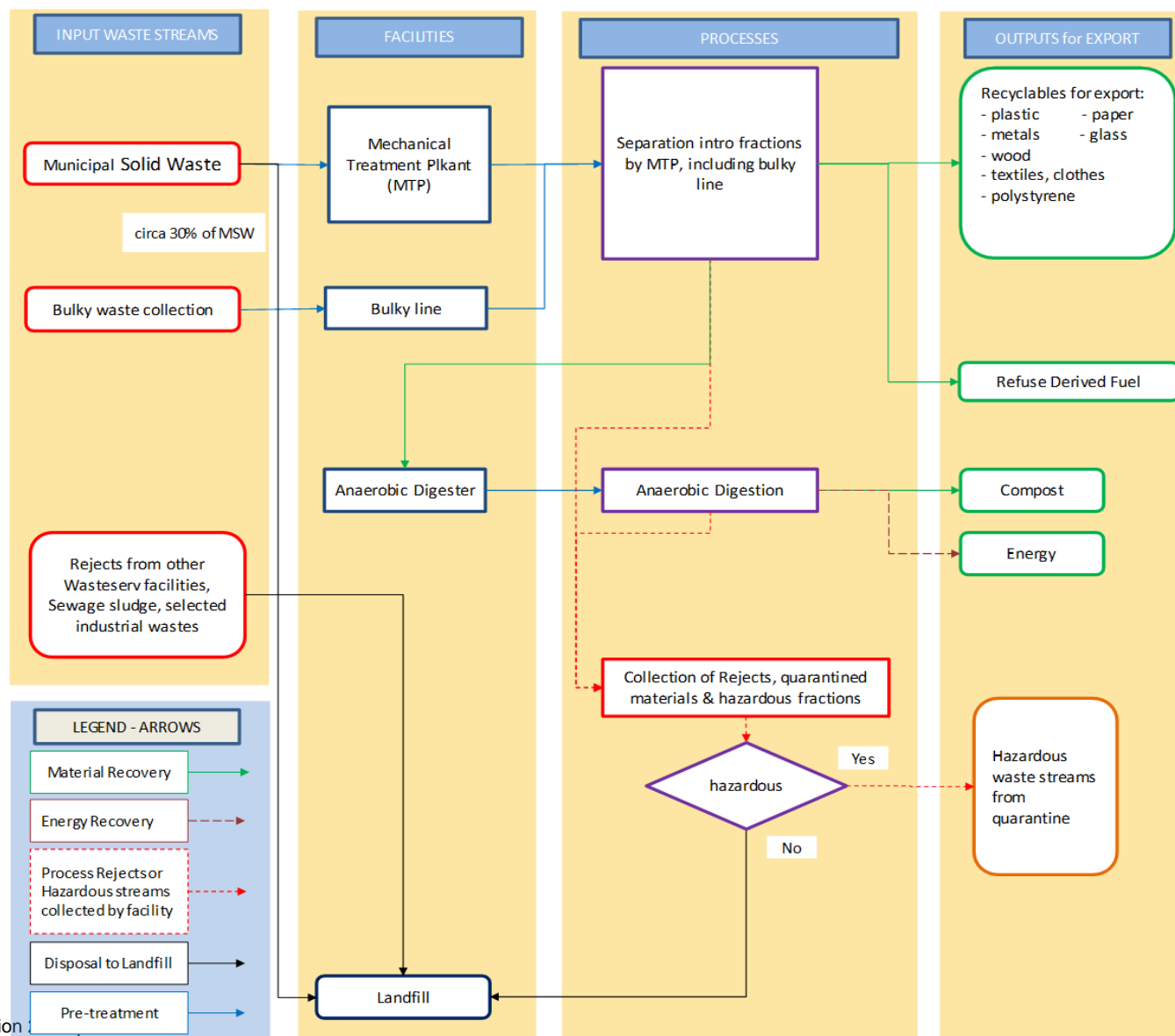


Figure 1: flow of wastes presently handled at Magtab by Wasteserv Malta Ltd., organised according to the processes used to treat the wastes prior to recovery or disposal. The various processes are organised according to the different facilities that are required to handle such wastes, and the various outputs are organised according to their eventual destination: recovery of material for recycling (mainly export to licensed facilities), recovery of energy (via generation of energy by incineration of waste or combustion of gas produced by anaerobic digestion), or disposal in landfill.

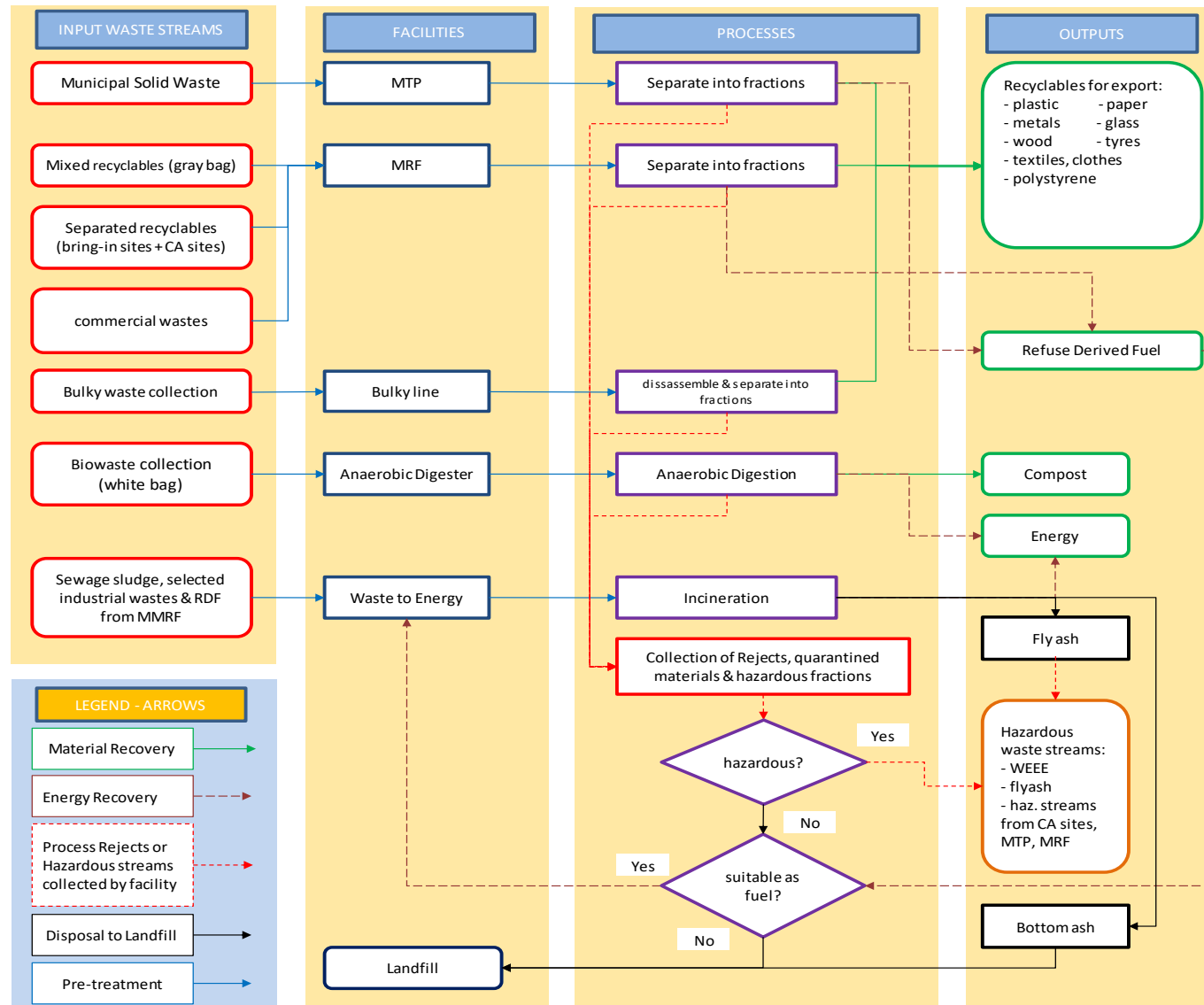


Figure 2: conceptual flow of wastes handled by Wasteserv Malta Ltd., organised according to the processes used to treat the wastes prior to recovery or disposal. The various processes are organised according to the different facilities that are required to handle such wastes, and the various outputs are organised according to their eventual destination: recovery of material for recycling (mainly export to licensed facilities), recovery of energy (via generation of energy by incineration of waste or combustion of gas produced by anaerobic digestion), or disposal in landfill.



Site description and context

20. The Ghallis Non-Hazardous Landfill consists of an engineered landfill facility designed for the disposal of non-hazardous wastes, and forms the core part of the Maghtab waste management complex. The latter is dedicated to the disposal needs of all non-hazardous waste streams generated in Malta, or to the diversion of waste streams to recovery or recycling processes in other permitted facilities.
21. This facility was designed as a disposal facility that implements the requirements of Directive 1999/31/EC on the landfill of waste as transposed by Legal Notice 168 of 2002 Waste Management (Landfill) Regulations. The landfill facility was originally approved for development by PA 04834/04 after an Environmental Impact Assessment process. Various development permits were required to permit various modifications and upgrades; these included PA 00964/11, which defined the boundary of the Ghallis non-hazardous landfill. The latter development permit applications formed part of a Master Plan for the Maghtab Environmental Complex, which was assessed via an update to the original EIS (GF 00121/06).
22. The operations of this facility were originally permitted on the 6th April 2007 through the issue of the integrated pollution prevention and control permit IP001/06/A; the renewal of this permit was decided on 31st January 2013 through the issue of IP001/06/B; further renewal of this permit is being considered by the competent authorities.
23. Construction of the landfill proceeded in phases consisting of independent cells, and certified via Construction Quality Assurance reports that were prepared during the construction of each cell. The engineering specifications were derived from the results of hydrogeological, landfill gas and stability risk assessments, to ensure that operations at the installation would not result in an adverse effect on the surrounding environment. Each cell has its own leachate collection/extraction system, as well as a gas extraction system connected to a central gas management facility.
24. At present, the construction of the final cell is currently being completed, and the gas extraction system that was the subject of the IPPC permit renewal in 2013 is being implemented. Work is expected to commence shortly on the recontouring of the eastern slope of the landfill using specialised engineering techniques, to gain additional landfill volume. This project effectively constitutes a set of two satellite cells located within the boundary of the Maghtab Environmental Complex, that is connected to the same common support infrastructure.

25. The location for the proposed development is circa 1km southeast of Qawra, which is located on the further side of Salina Bay. The immediate adjacent area are the haul roads inside the Maghtab Environmental Complex, with agricultural fields to the west. Public access to the Maghtab Environmental Complex is precluded by various security measures.
26. The surrounding land uses have been surveyed in terms of nature and extent in the Master Plan for the Maghtab Environmental Complex - Environmental Impact Statement Update prepared in support of development permit Application No. PA 02342/06 (Adi Associates Environmental Consultants Ltd, 2011). Current surrounding land uses include:
- i) The adjacent waste management facilities forming part of the Maghtab Environmental Complex, including the Civic Amenity site, the Malta North Waste Treatment Plant, and the Zwejra and Maghtab landfills;
 - ii) the Maghtab settlement over 600m away;
 - iii) The Salini Resort (Coastline) hotel at a minimum of 600m to the northwest of the furthest point of the extended area;
 - iv) Various residences to the west and the south;
 - v) A private waste management facility to the south;
 - vi) Various industrial units;
 - vii) Natural habitats in the vicinity of the Maghtab landfill that have been studied as part of previous Environmental Impact Assessments;
 - viii) Small farmhouses and ancillary buildings, including an adjacent cow farm; and
 - ix) Roads, including access roads to the Maghtab complex to the south, and the Coast Road to the west.
27. The various EIA studies carried out for developments related to the Maghtab Environmental Complex have included various studies on the cultural, archaeological and environmental characteristics of the areas surrounding the site. A review of the studies highlighted above indicate that the surrounding undeveloped areas include natural areas, mainly coastal steppe, and limited pockets of maquis vegetation. Other areas are either disturbed land, or agricultural fields.

28. The following areas – at varying distances away from the project area - have been designated as Special Area of Conservation as per Habitats Directive (94/43/EEC):

- The adjacent marine areas Zona fil-Bahar fil-Grigal ta Malta;
- L-Ghadira s-Safra has been designated as Special Area of Conservation; and
- Is-Salini)

While the proposed development should not impact these sites directly, the indirect effects of this development on these sites is expected to be the equivalent of that exerted by the existing landfill facilities.

29. Future landfill requirements will eventually necessitate an extension outside the approved boundary of the Maghtab Environmental Complex, given that all internal areas would have been exhausted. Future landfill development should be given due consideration to ensure that future needs are met, and that there is some degree of consistency between stages of landfill development. A phased approach would be recommended, to stagger the development into phases that serve to delay land take for as long as possible, while allowing for the development of cells that have the maximum void space that could be designed.

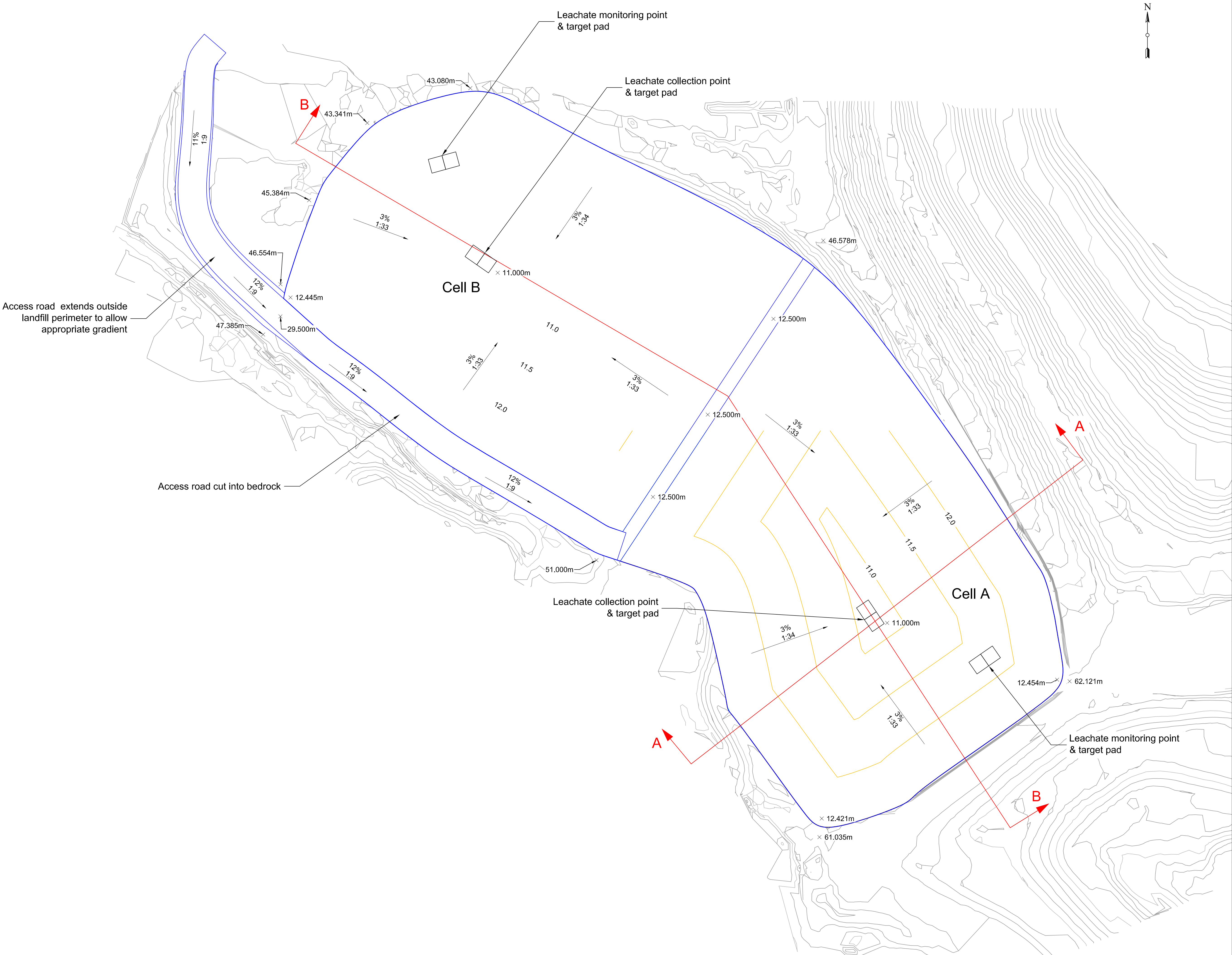
Project Description

30. This project involves the development of additional non-hazardous landfill void space within the existing confines of the Maghtab Environmental Complex, through conversion and extension of the existing ex-hazardous landfill as indicated in Plan 1. This will not involve any intervention outside of the complex, but will involve the extension of the permitted hazardous cell, and the extension of the south-eastern border to maximise the void space gained, and consequently its lifetime.
31. The boundary of this project, together with the planned access route are given in Image 3 and Plan 1. This boundary is an extrapolation from that of the existing hazardous cell, with the rationale for the extension being the efficient use of land to maximise the void space to be gained.
32. The current size of the hazardous landfill cell is 29,570m², and a volume of circa 155,500m³. The latter volume would accommodate about half a year of landfill void space demand. To improve land use efficiency, the use of innovative engineering technologies (described in the following sections) are being proposed to accommodate circa a million cubic metres of landfill void space, approximately equivalent to 3.5 years demand. The use of vertical lining systems, originally used in the mining industry, are now being utilised in the landfill sector; as a result, the available void space is six times that of traditional landfill lining systems that have a maximum side slope profile of 45°.
33. Plan 2 describes the proposed base of the landfill, which is divided into two cells. The deepest part of each cell will be the centre, with the bottom profile inclined at an angle that will direct leachate flow towards the leachate collection points. Sections through the cells are provided in Plan 4, where it can be noted that the cell structure will deviate from the traditional landfill technique used to date, and to make use of a vertical lining system.

Image 3: the extension of the permitted hazardous cell, and the extension of the south-eastern border of the cell.



Plan 2: the extension of the permitted hazardous cell, including detail regarding the cell floor profile and leachate collection infrastructure.



NOTES

Drawings are produced to present a conceptual design of the proposed engineering design. Designs are subject to final approval and subject to change. Drawings must not be used as construction drawings.



PROJECT TITLE

Construction of a Steep Wall Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Landfill Formation Plan

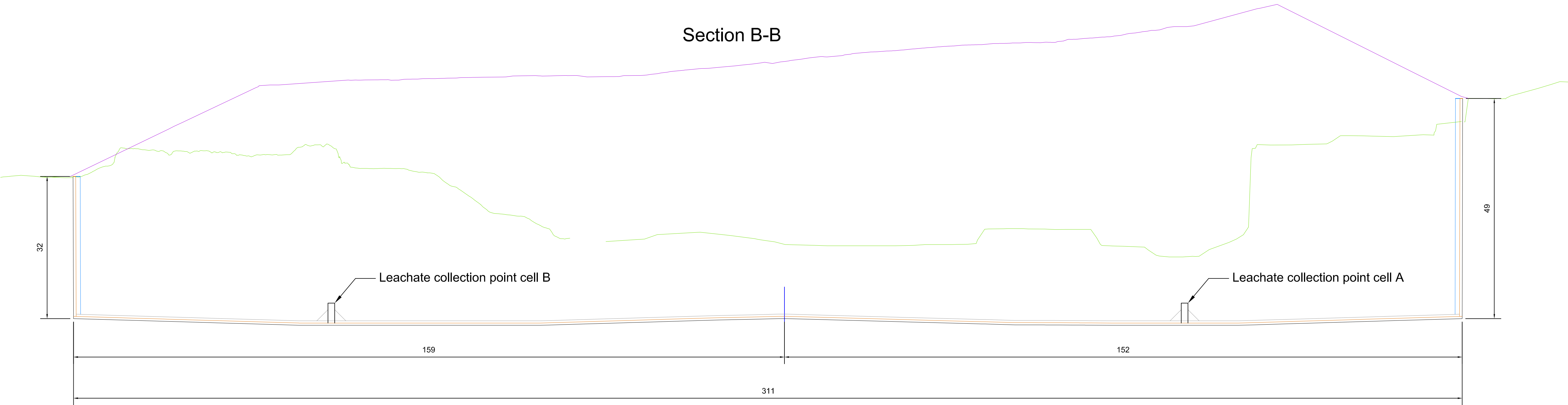
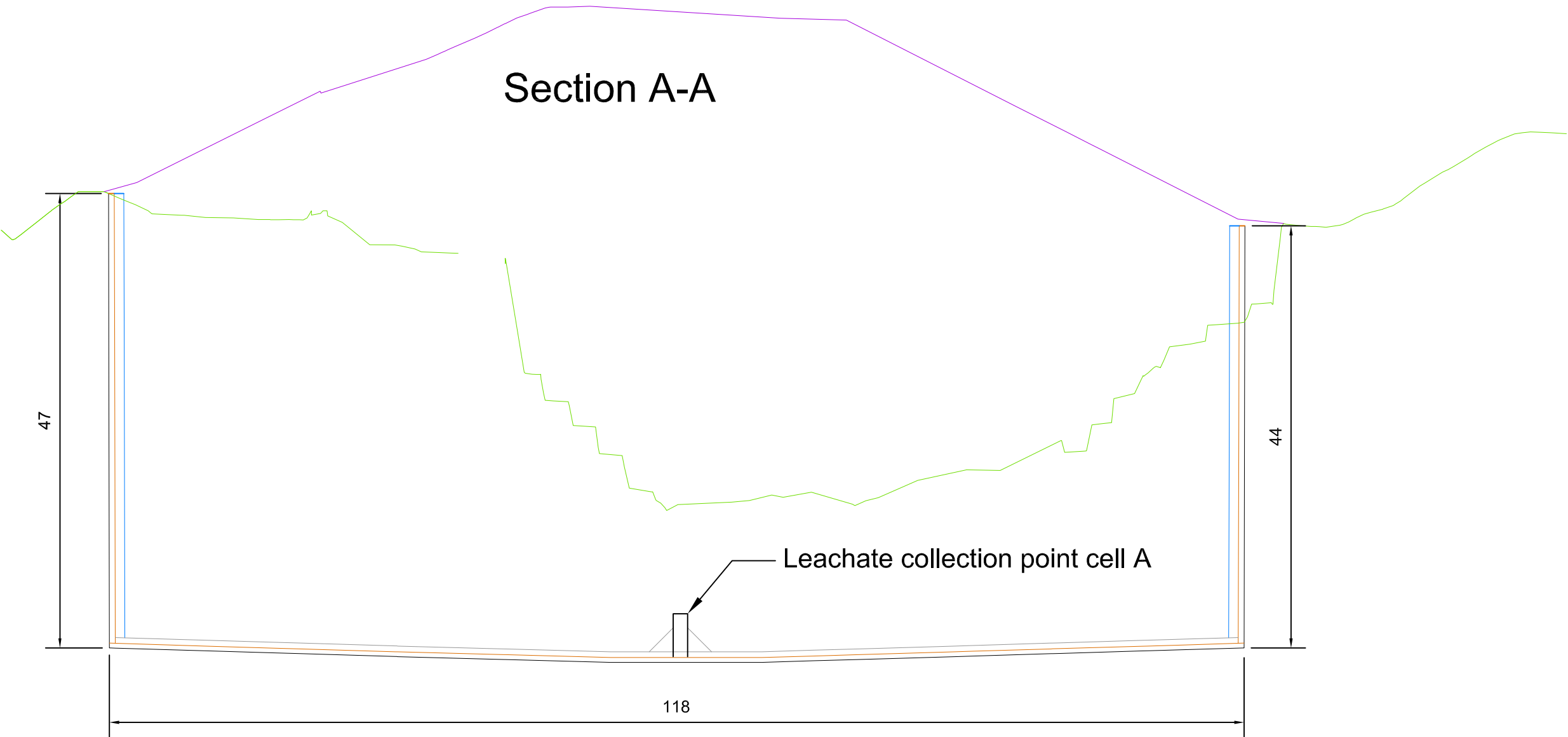
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0	14/02/2019	DB	First Issue
Rev	Date	Chkd	Description

DESIGNED	RWS	DRAWN	RWS
SCALES @ A1	1:500	DATE	05/04/2019



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DRAWING NUMBER	REV
30374/WSM/SW/FD/02	01



NOTES

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LEGEND

- Topographic surface as of November 2018
- Formation surface
- Mineral liner
- Drainage layer
- Protection layer
- Restoration surface



PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Landfill Sections

REVISIONS

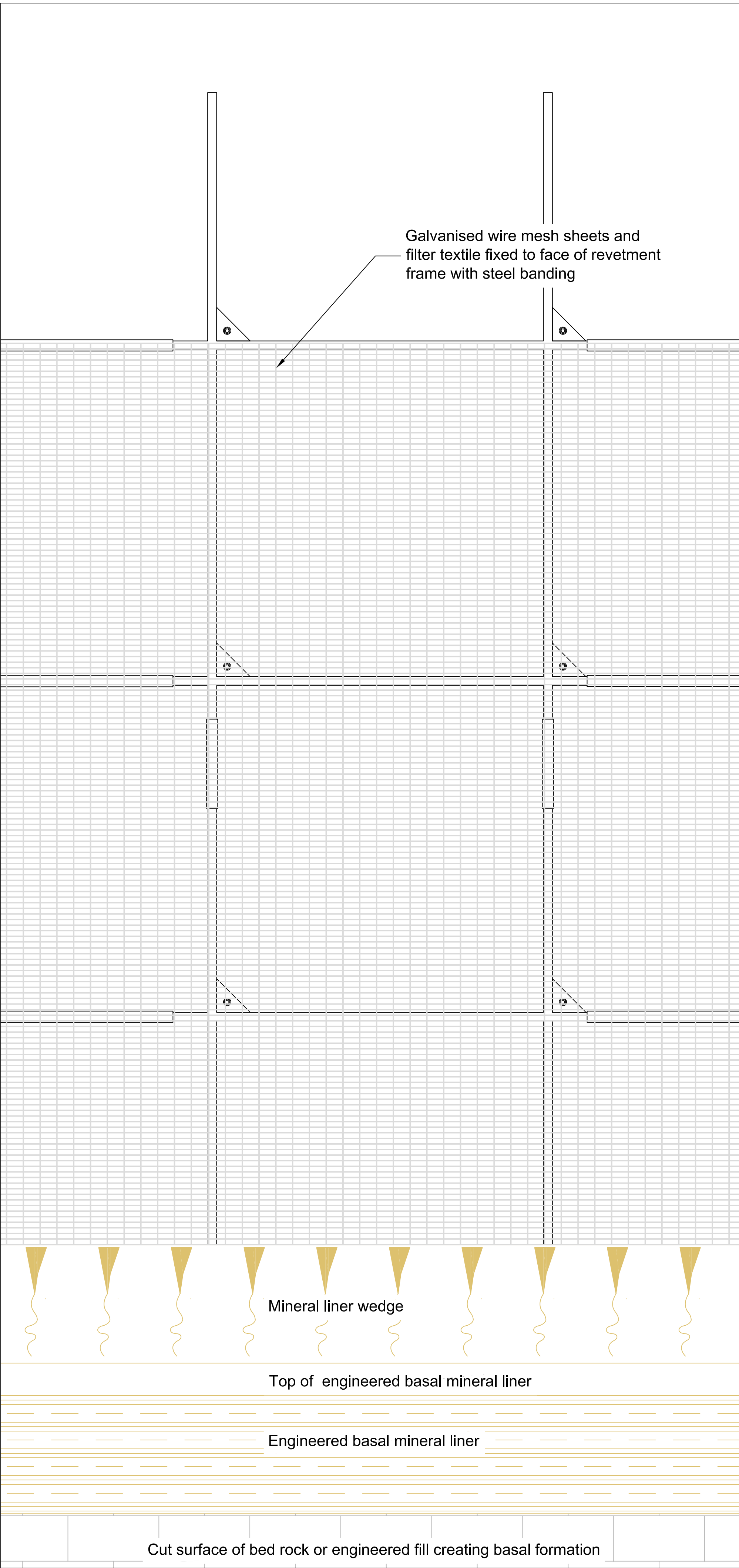
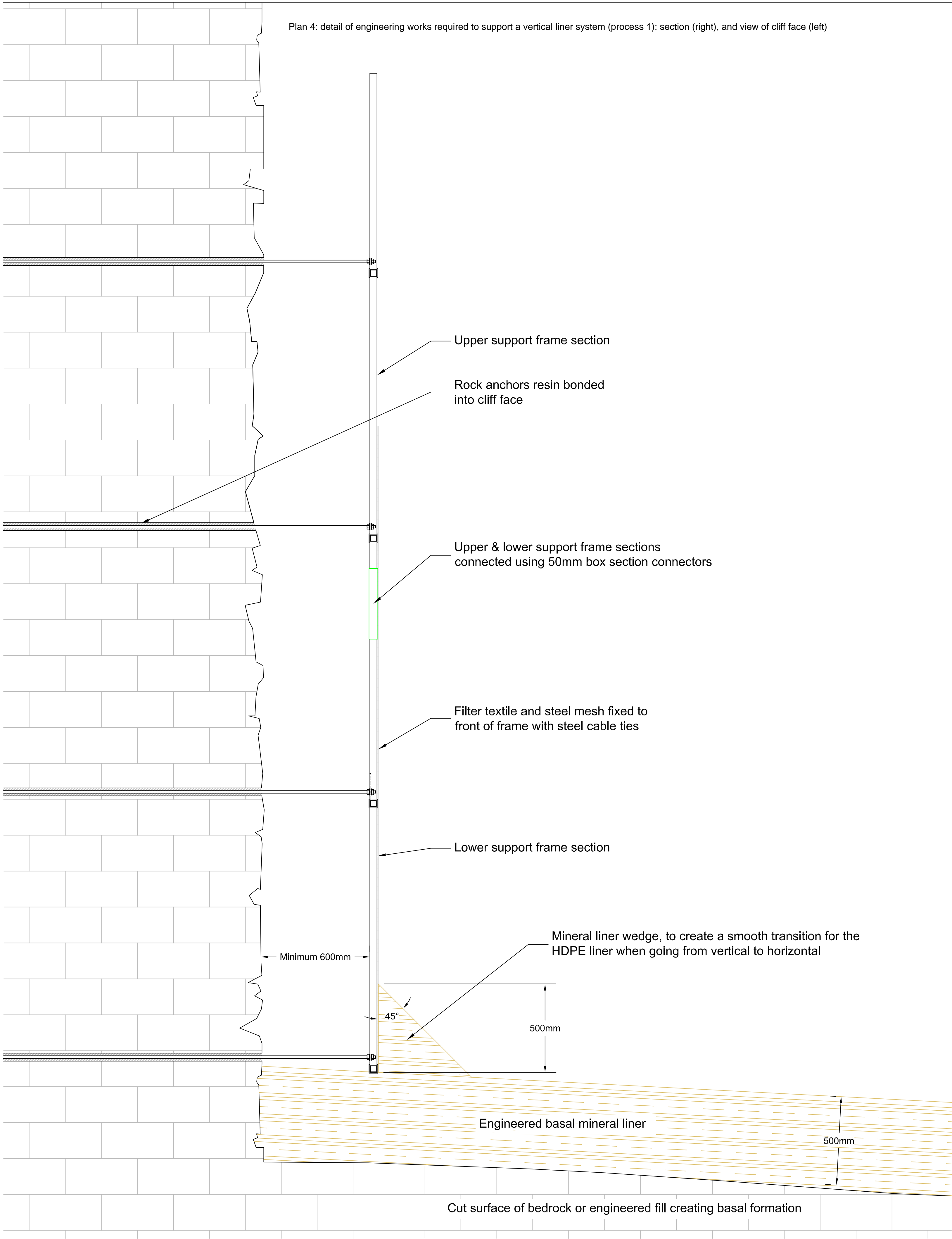
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DRAWING NUMBER	REV
30374/WSM/SW/FD/04	01



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PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Construction Sequence Details 1
3m High Steep Wall Lift 1

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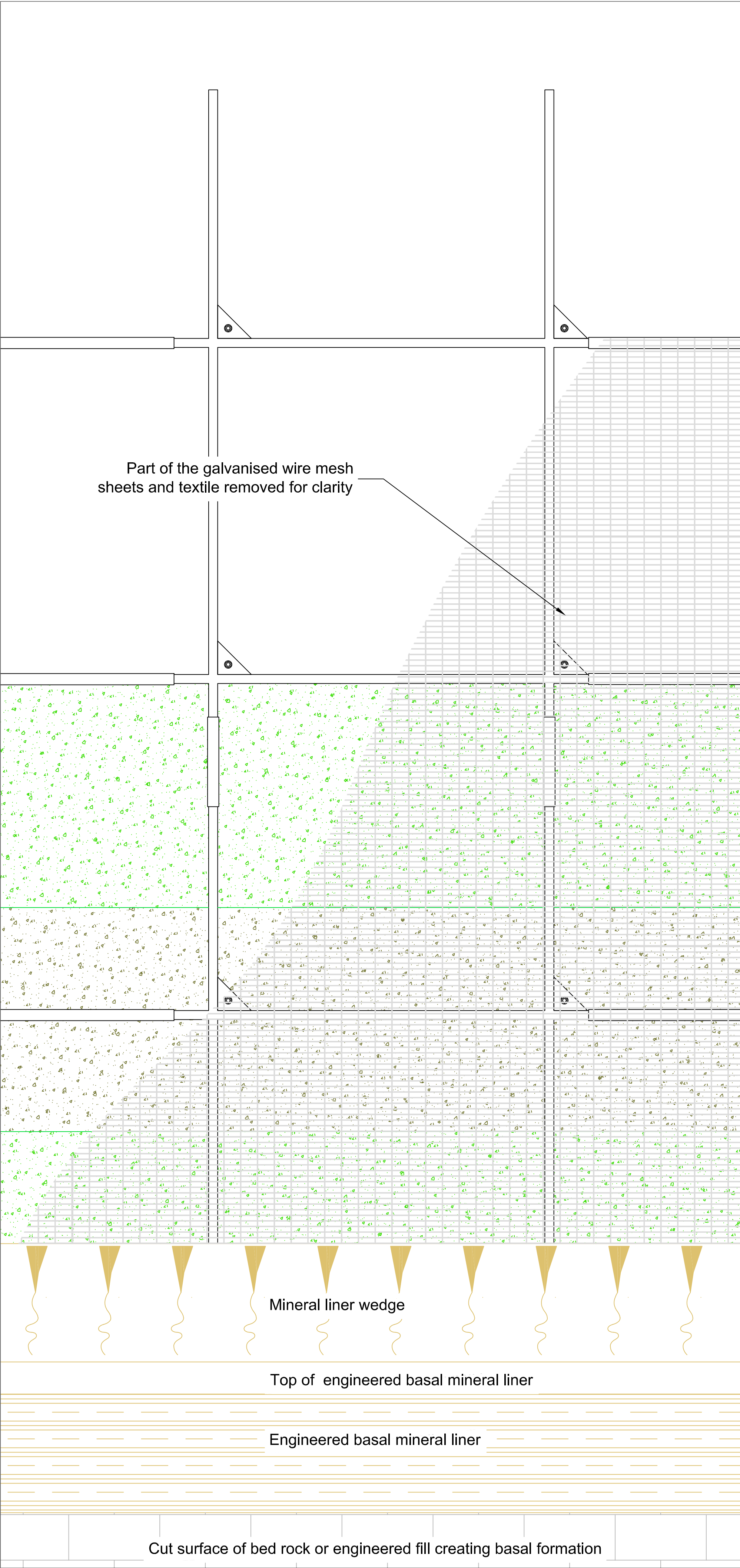
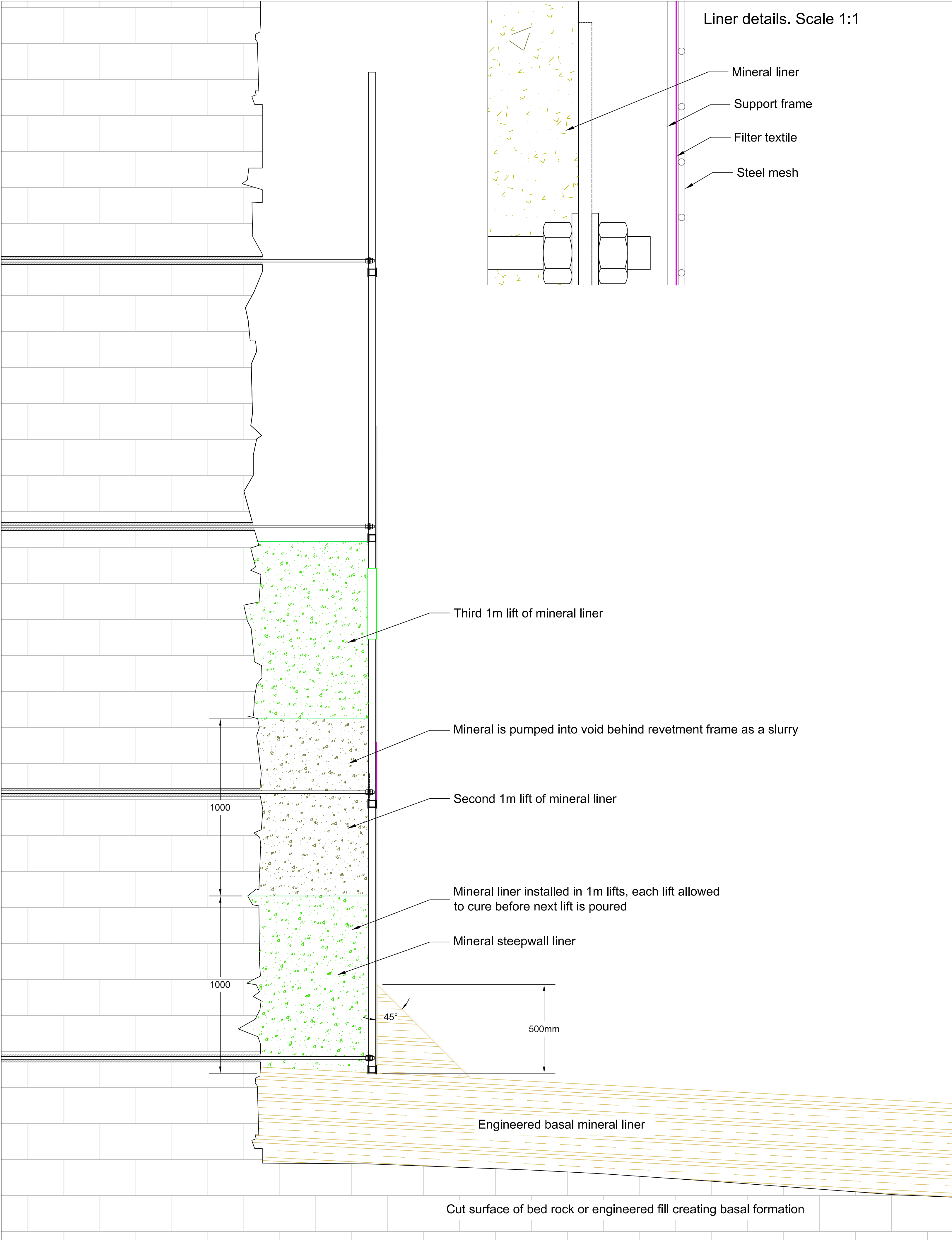
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DESIGNED	RWS	DRAWN	RWS
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CQA

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DRAWING NUMBER	REV
30374/WSM/SW/FD/05	01



NOTES

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PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Construction Sequence Details 2
3m High Steep Wall Lift 1

REVISIONS

Rev	Date	Chkd	Description
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0	14/02/2019	DB	First Issue

DESIGNED RWS DRAWN RWS

SCALES @ A1 1:12.5 DATE 05/04/2019



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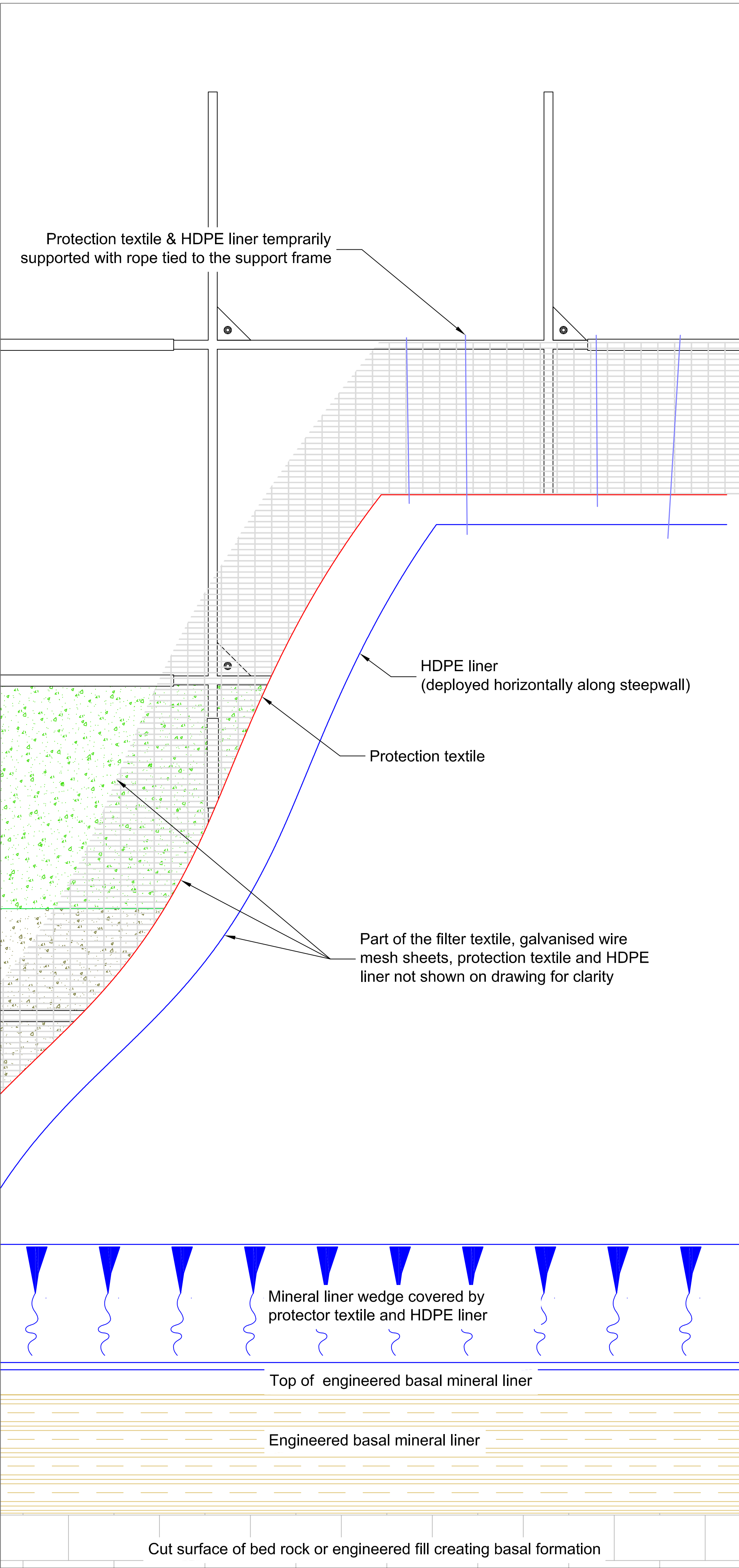
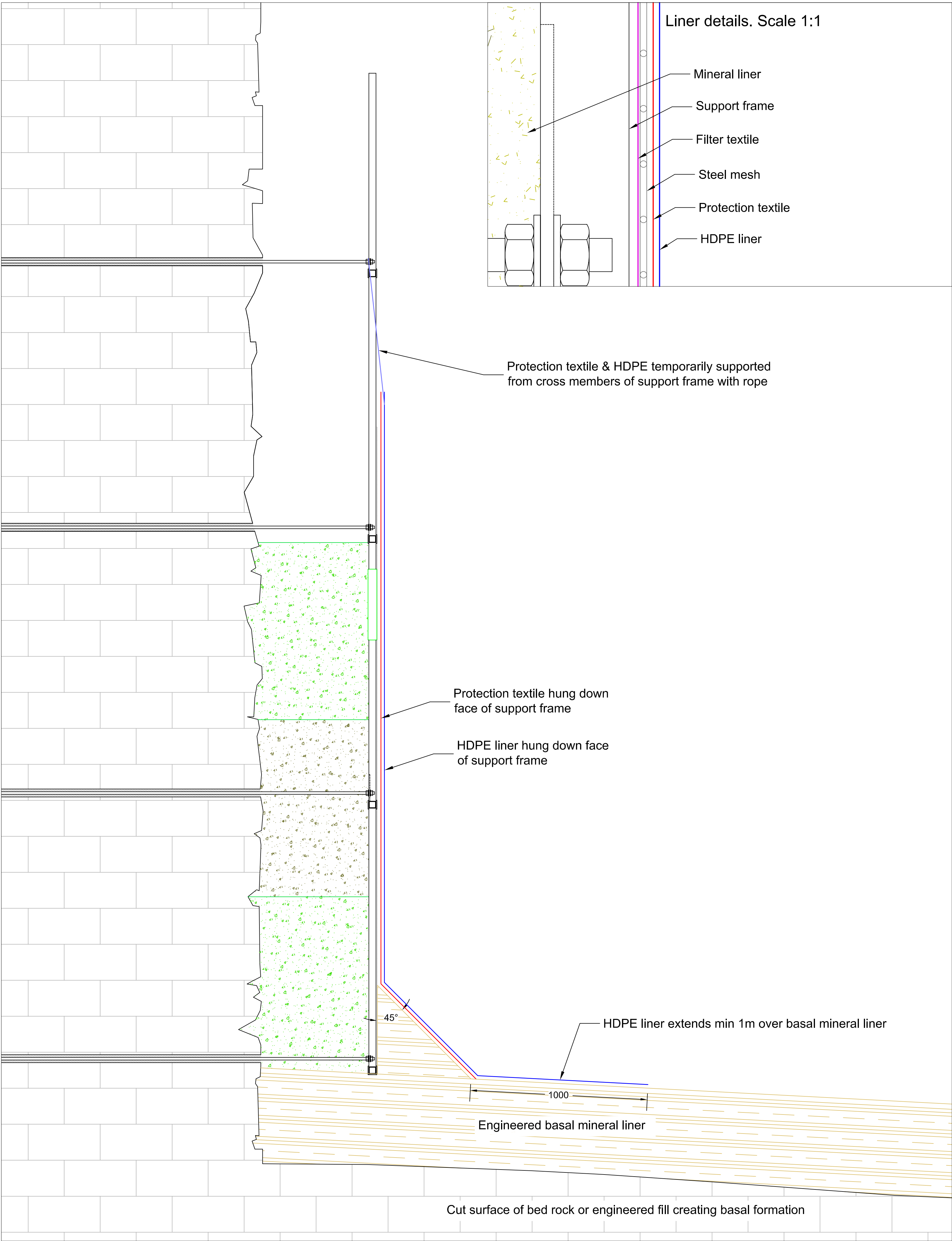
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Plan 6: detail of engineering works required to support a vertical liner system (process 3): section (right), and view of cliff face (left)



NOTES

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PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Construction Sequence Details 3
3m High Steep Wall Lift 1

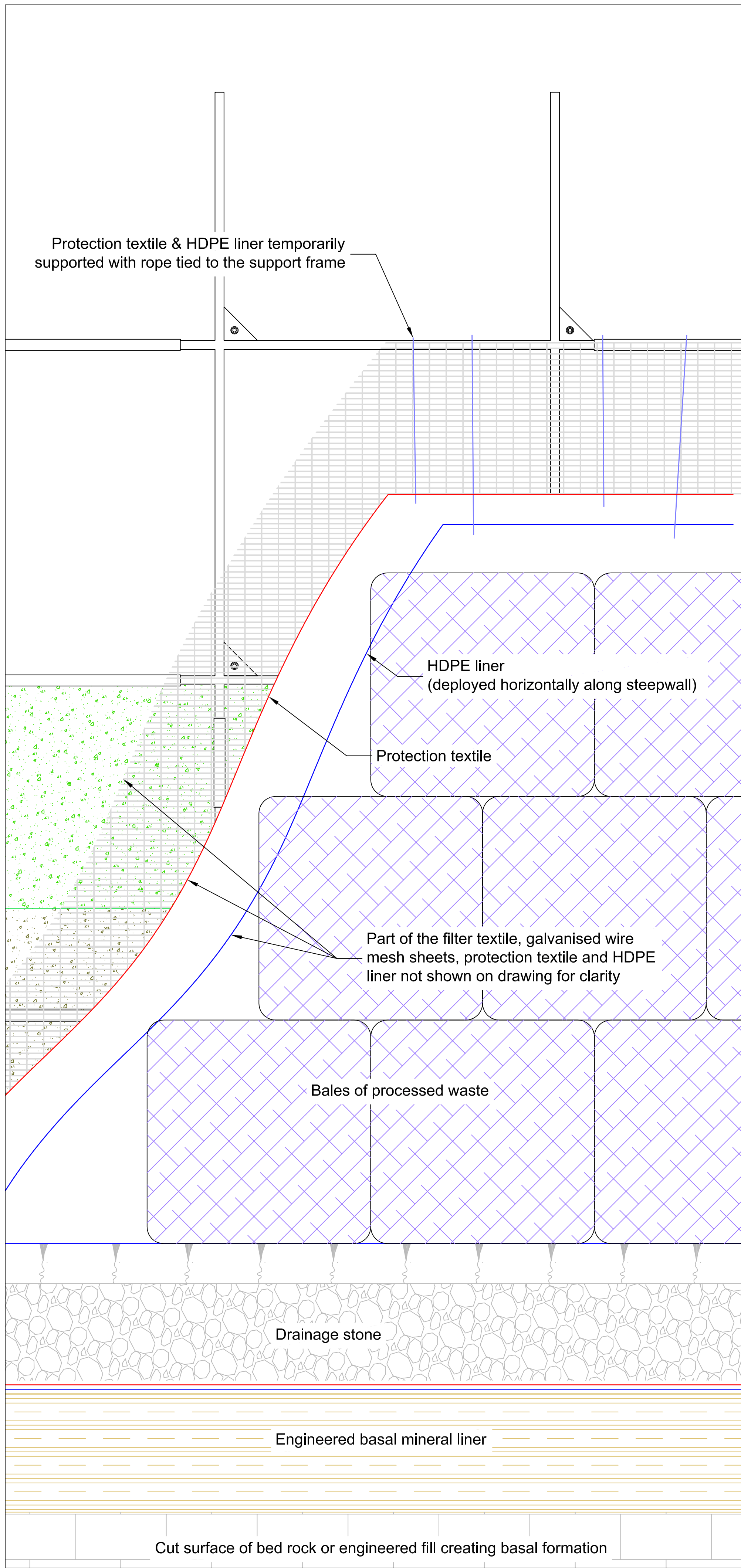
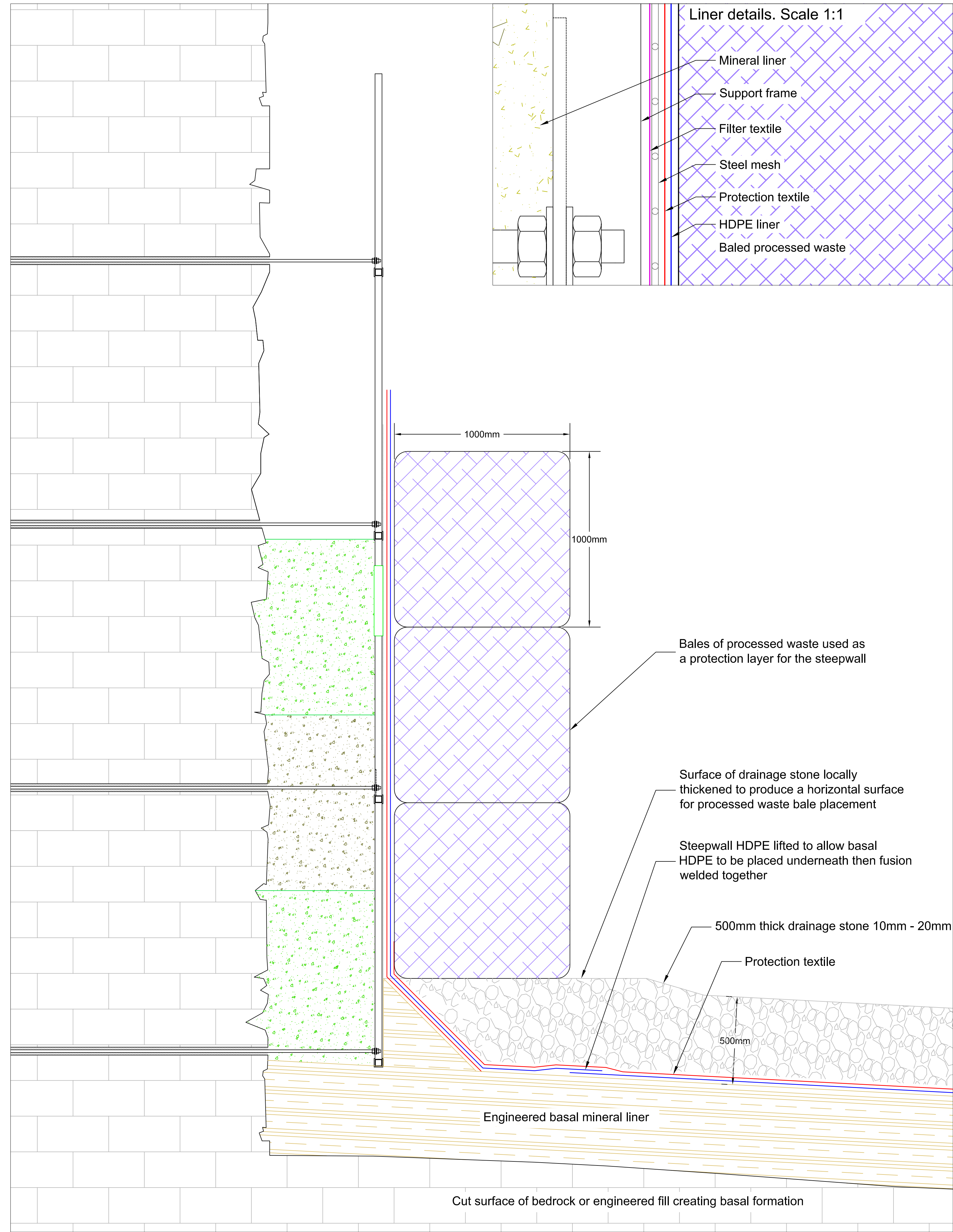
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NOTES

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PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Landfill

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

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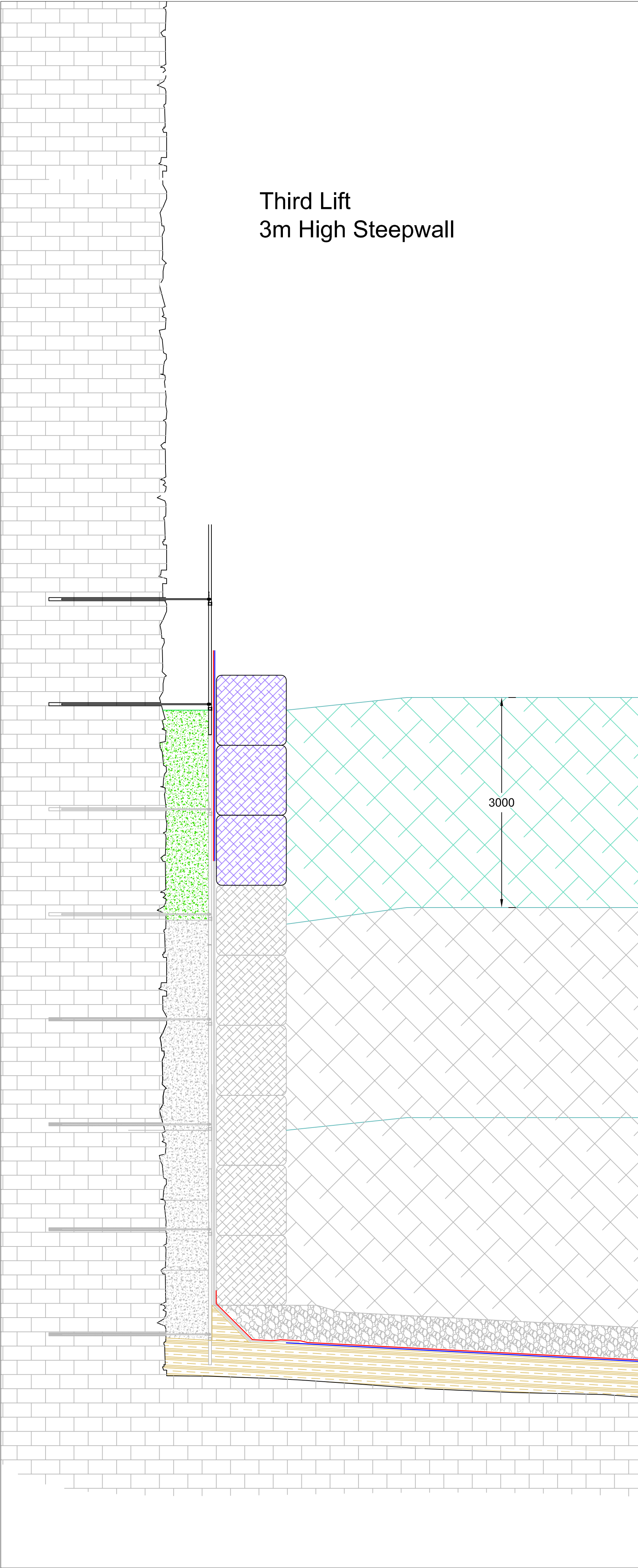
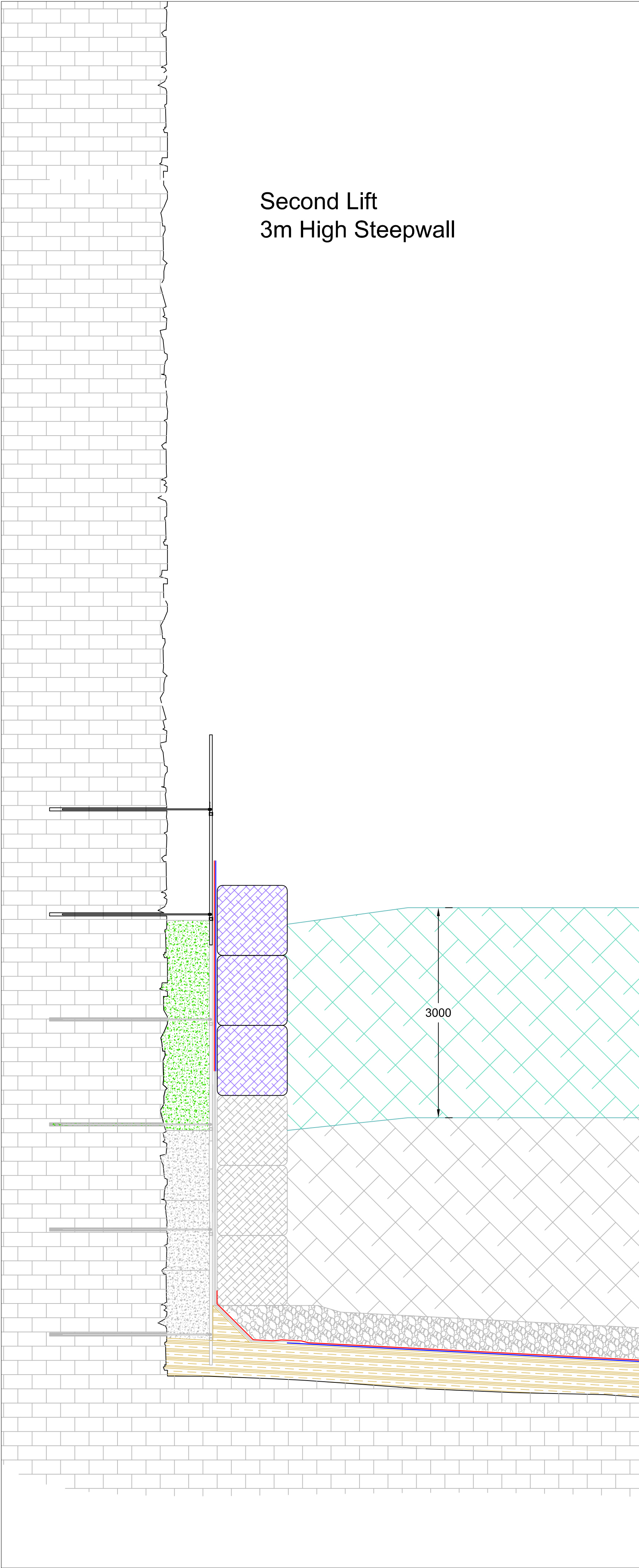
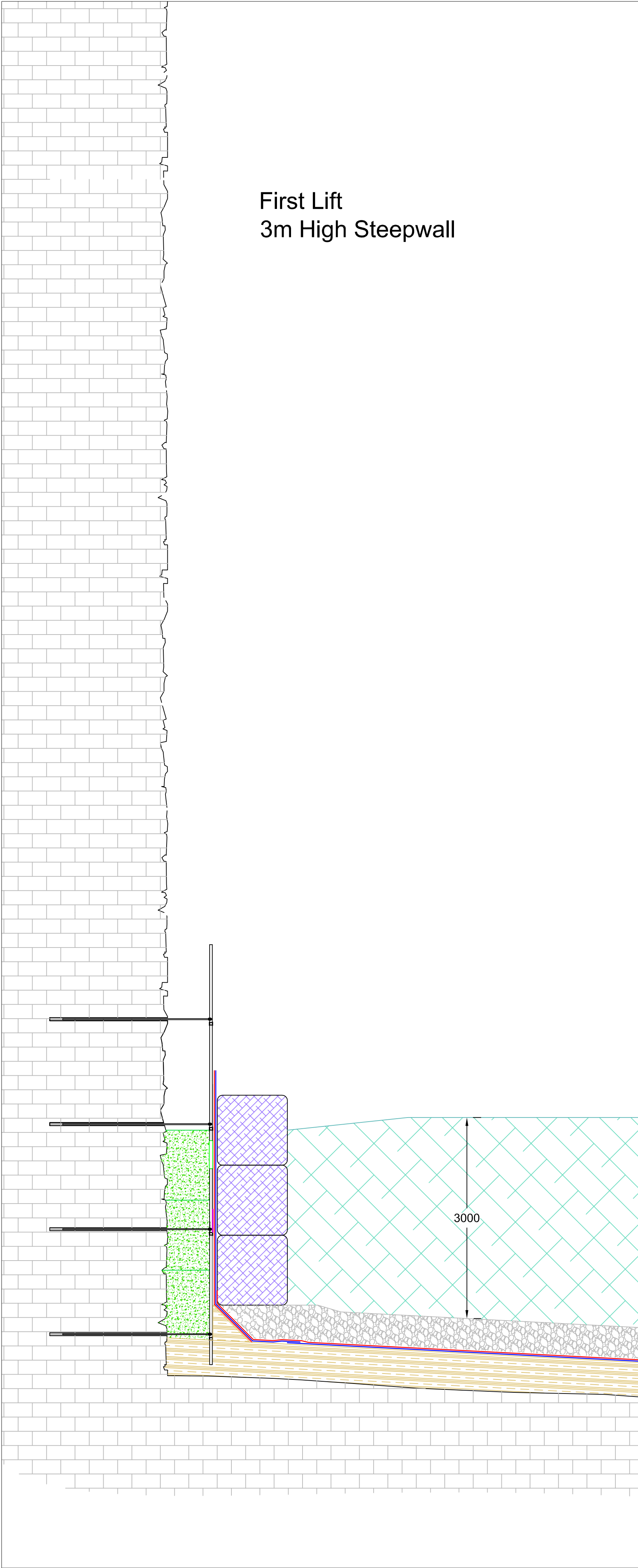
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SCALES @ A1	1:12.5	DATE	05/04/2019



CQA International limited

DRAWING NUMBER	REV
30374/WSM/SW/FD/08	01



NOTES

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Demonstration of construction sequence which will be repeated to full height of excavation as waste filling progresses.



PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Landfill

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Construction Sequence for 3m High
Steep Wall Lifts 1, 2 & 3

REVISIONS

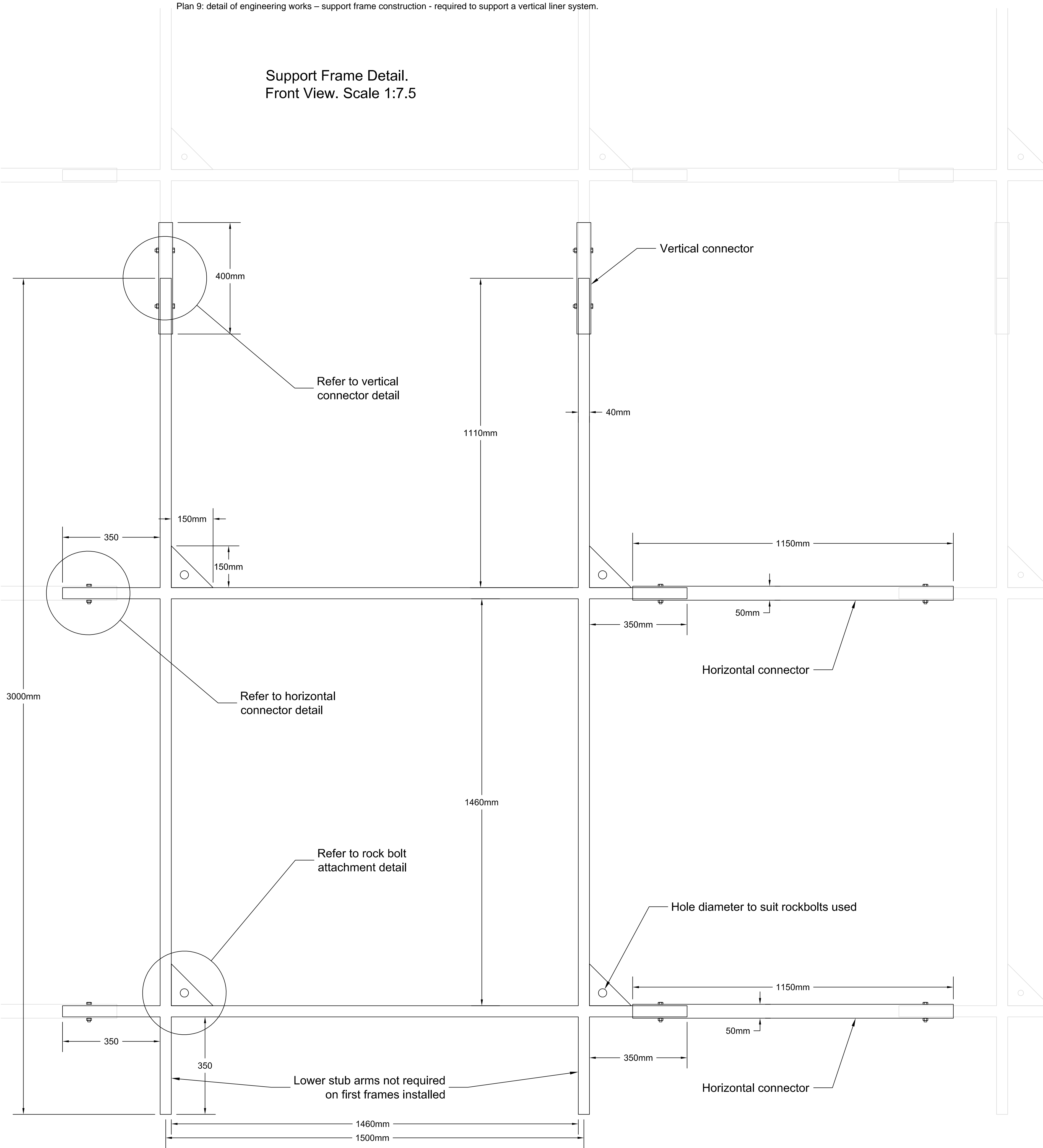
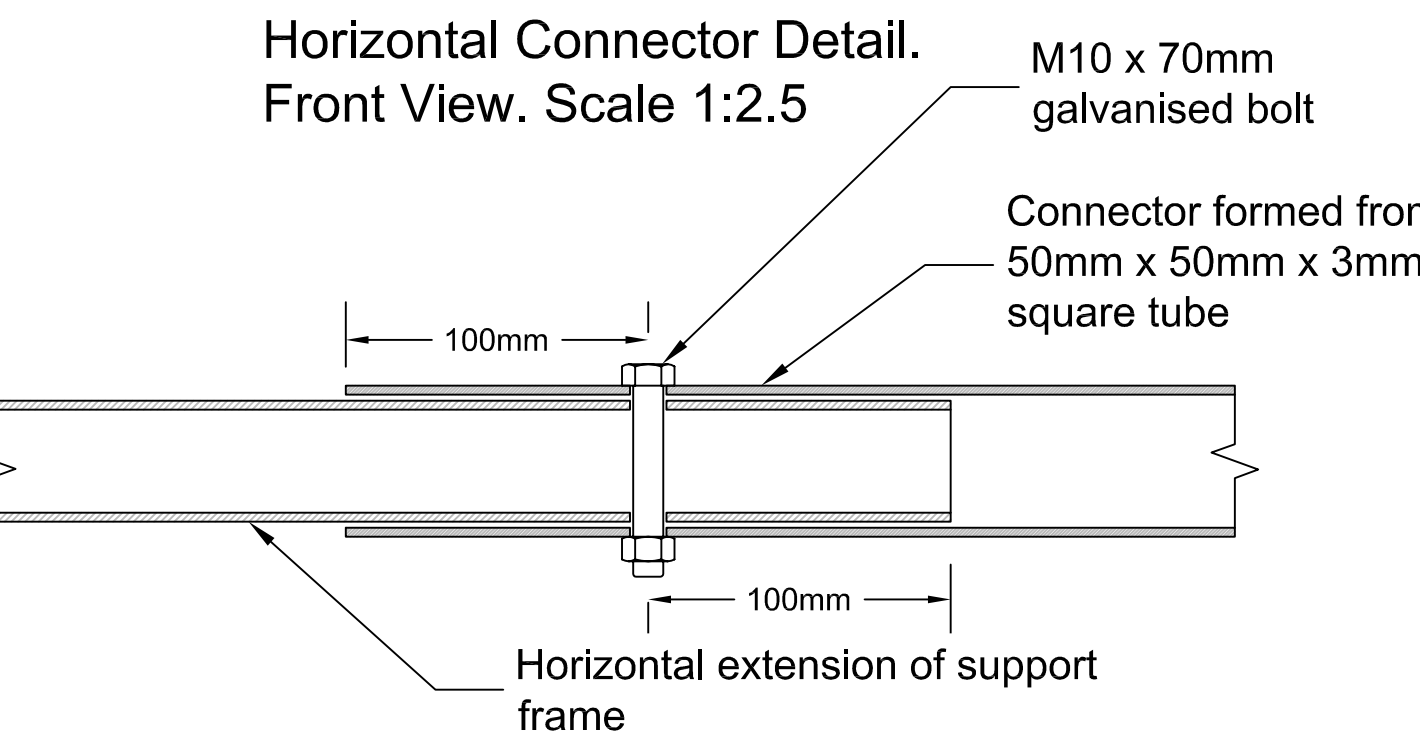
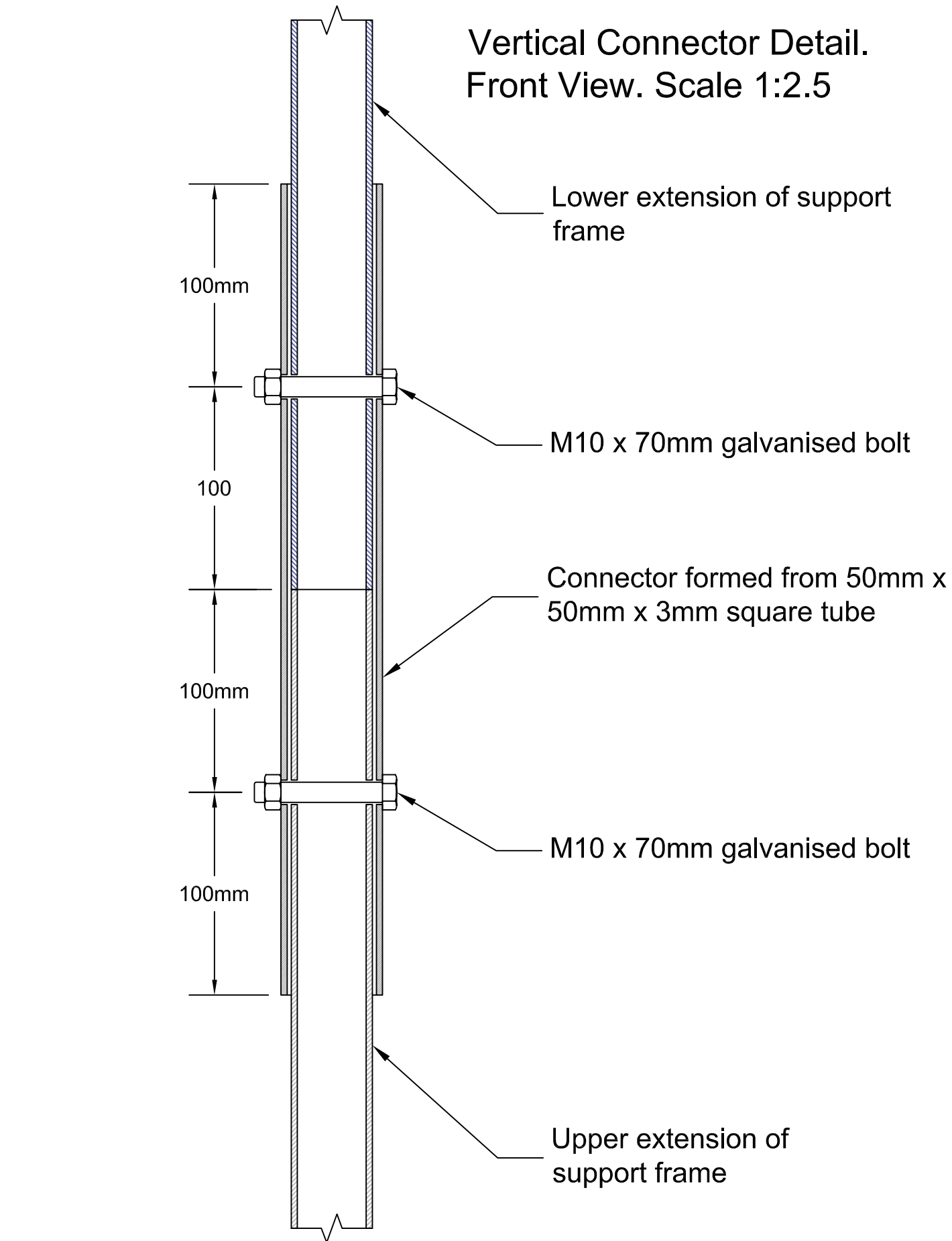
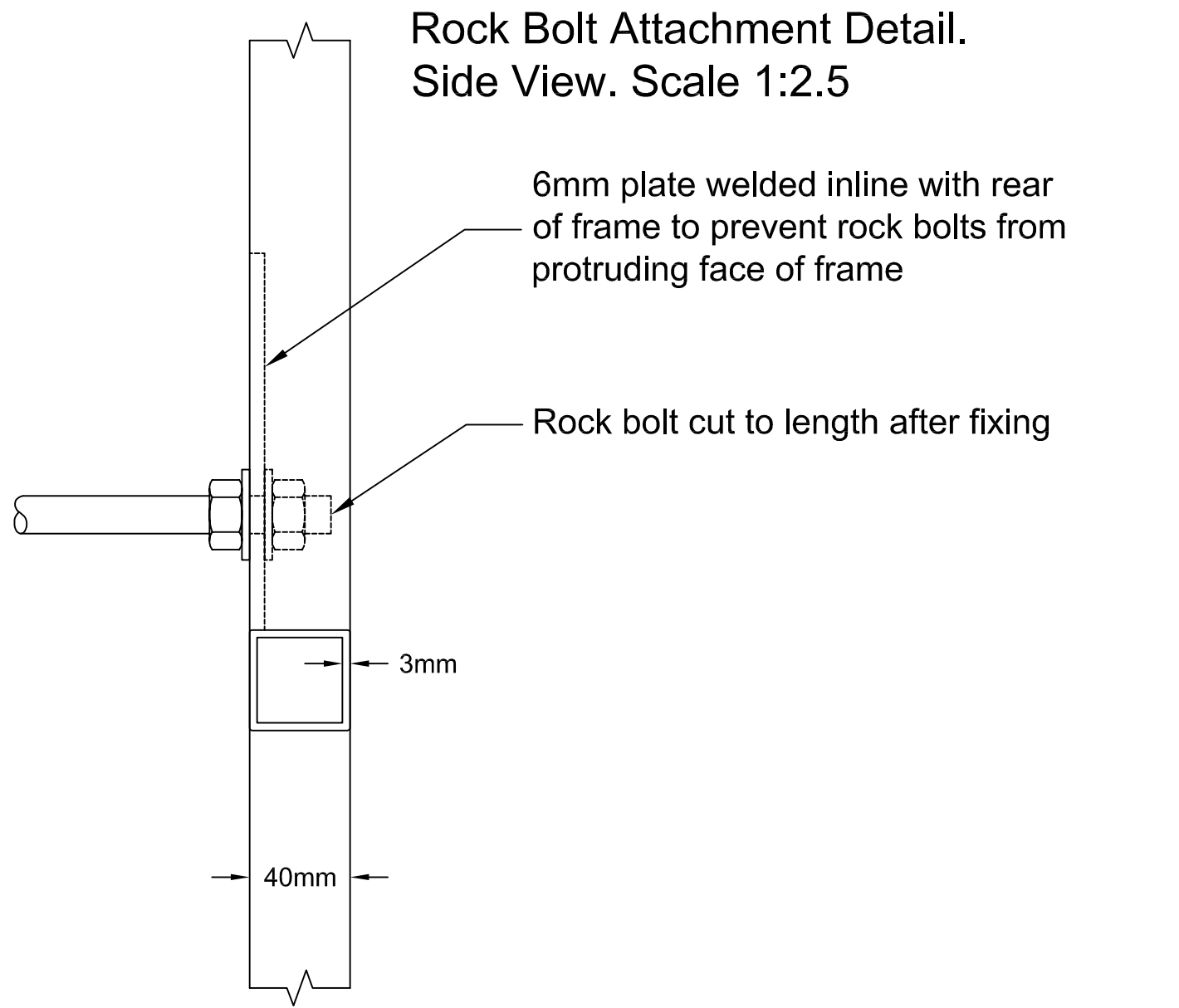
1	05/04/2019	DB	Note added
0	14/02/2019	DB	First Issue
Rev	Date	Chkd	Description

DESIGNED	RWS	DRAWN	RWS
SCALES @ A1	1:400	DATE	05/04/2019

CQA

CQA International limited

DRAWING NUMBER	REV
30374/WSM/SW/FD/09	01



NOTES

Drawings are produced to present a conceptual design of the proposed engineering design. Designs are subject to final approval and subject to change. Drawings must not be used as construction drawings.

The support frame sections are prefabricated from 40mm x 40mm x 3mm thick mild steel box section and of welded construction.

The connectors are formed from 50mm x 50mm x 3mm thick mild steel box section.

All connection holes to drilled prior to galvanizing.

This drawing should **ONLY** be used for design purposes, **NOT FOR FABRICATION**.



PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Landfill

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Support Frame Construction Details

REVISIONS

1	05/04/2019	DB	Note added
0	14/02/2019	DB	First Issue
Rev	Date	Chkd	Description

DESIGNED RWS DRAWN RWS

SCALES @ A1 As shown DATE 05/04/2019



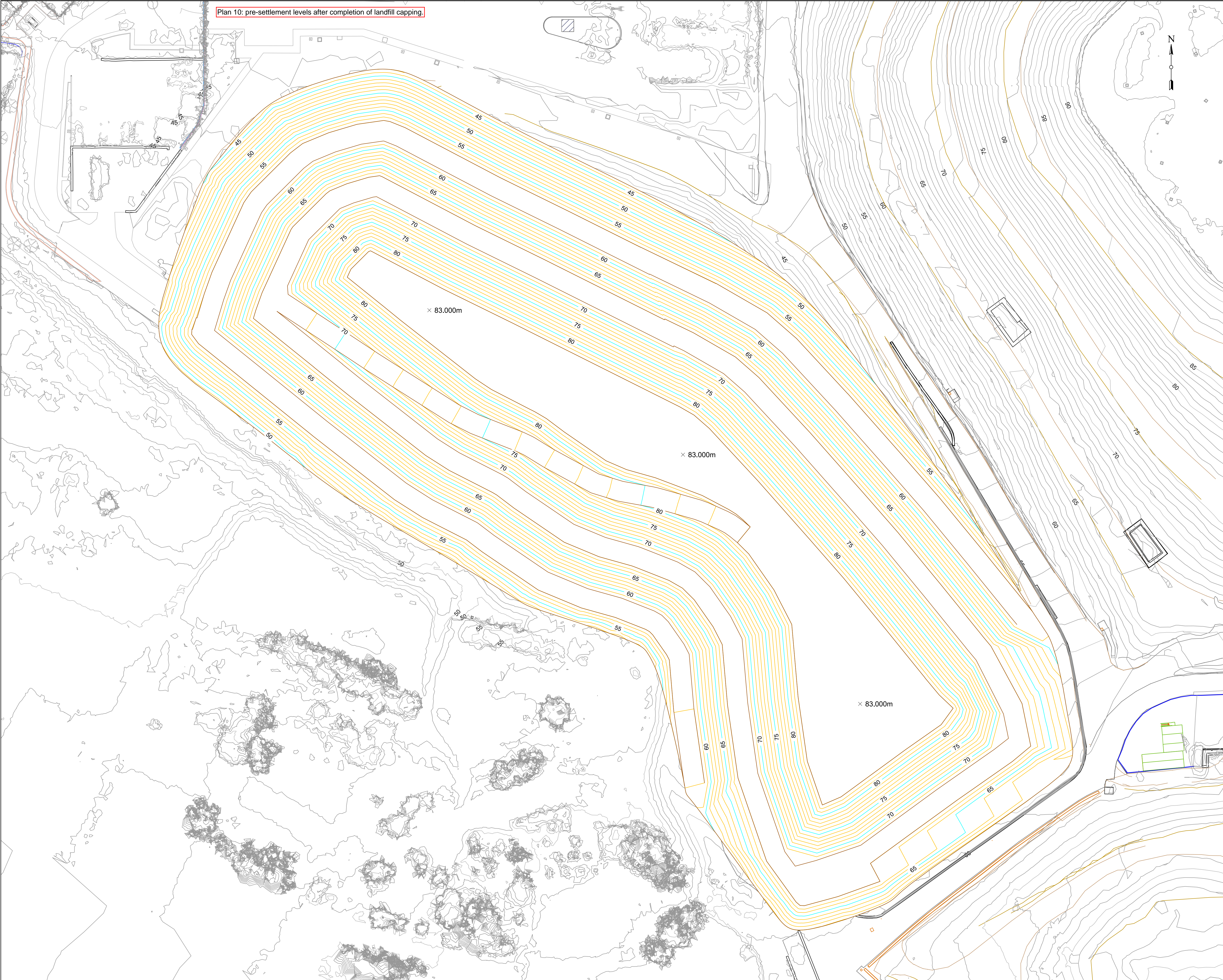
CQA International limited

DRAWING NUMBER

30374/WSM/SW/FD/10

REV

01



NOTES

LEGEND

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GRAPHIC SCALE 1:500

PROJECT TITLE
Construction of a Steep Wall
Non-Hazardous Waste Cell

PROJECT NUMBER
30374

CLIENT
Wasteserv Malta Ltd.

LOCATION
Magtab Environmental Complex

DRAWING TITLE
Pre - Settlement Surface

REVISIONS

0	29/11/2019	DB	First issue
Rev	Date	Chkd	Description

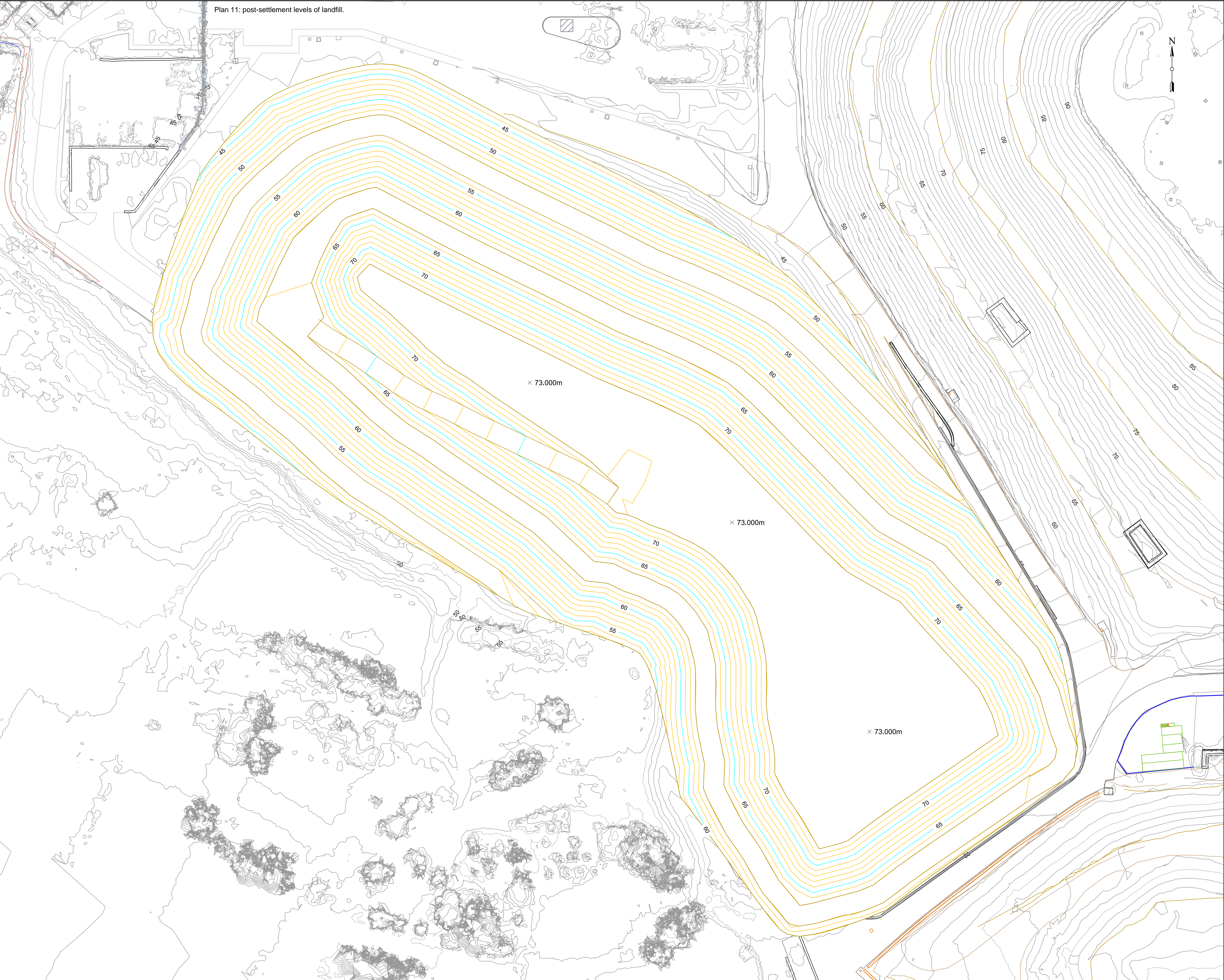
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DRAWN RWVS
DATE 29/11/2019

CQA
CQA International limited

DRAWING NUMBER
30374/WSM/SL/02

REV
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NOTES

LEGEND

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GRAPHIC SCALE 1:500

PROJECT TITLE

Construction of a Steep Wall
Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.
WASTESERV
CREATING RESOURCES FROM WASTE

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Post - Settlement Restoration Surface

REVISIONS

0	29/11/2019	DB	First issue
Rev	Date	Chkd	Description

DESIGNED	RWS	DRAWN	RWS
SCALES @ A1	1:500	DATE	29/11/2019

CQA

CQA International limited

DRAWING NUMBER

30374/WSM/SL/03

REV

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Plan 12: location of sections through landfill.

The map displays a topographic representation of a landfill site. Key features include:

- Contour Lines:** Grey lines indicating elevation, with labels such as 83.000m, 100, 150, 200, 250, 300, 350, 400, and 450.
- Section Lines:** Purple lines labeled with elevations: CH 78.667m, CH 150.922m, CH 246.571m, and CH 376.677m.
- Red Line:** A red line with elevation markers (0, 50, 100, 150, 200, 250, 300, 350, 400) running diagonally across the landfill area.
- Landfill Area:** A large, irregularly shaped area outlined in orange and yellow, representing the landfill's extent.
- Surrounding Area:** Includes a road network, a building complex (top right), and a parking area (bottom right).
- North Arrow:** Located in the top right corner, pointing towards the top of the map.

NOTES

LEGEND

Section locations for sections shown
on drawing 30374/WSM/SL/05

PROJECT TITLE

Construction of a Steep Wall Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Section Locations

REVISIONS

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Rev	Date	Chkd	Description

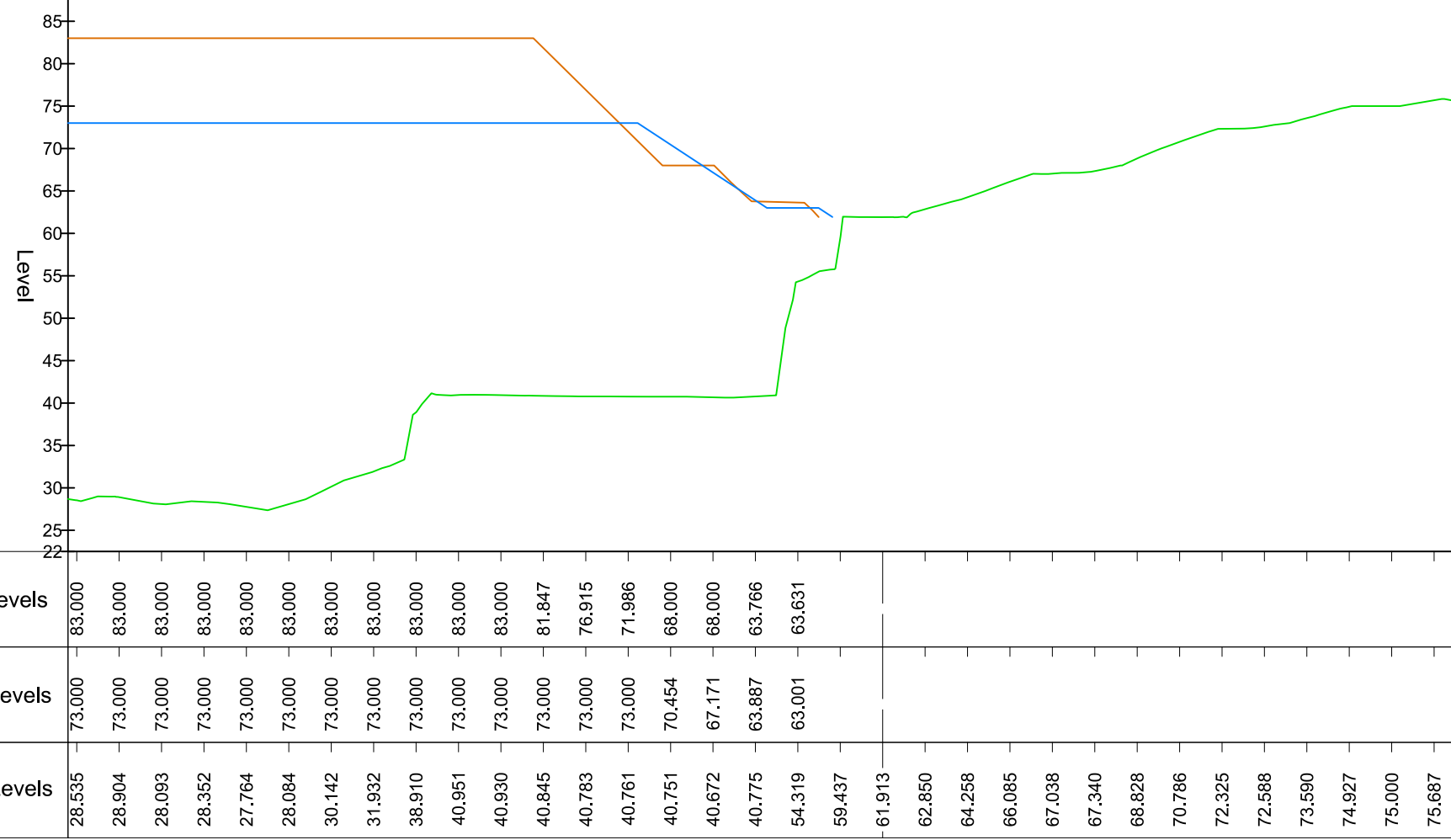
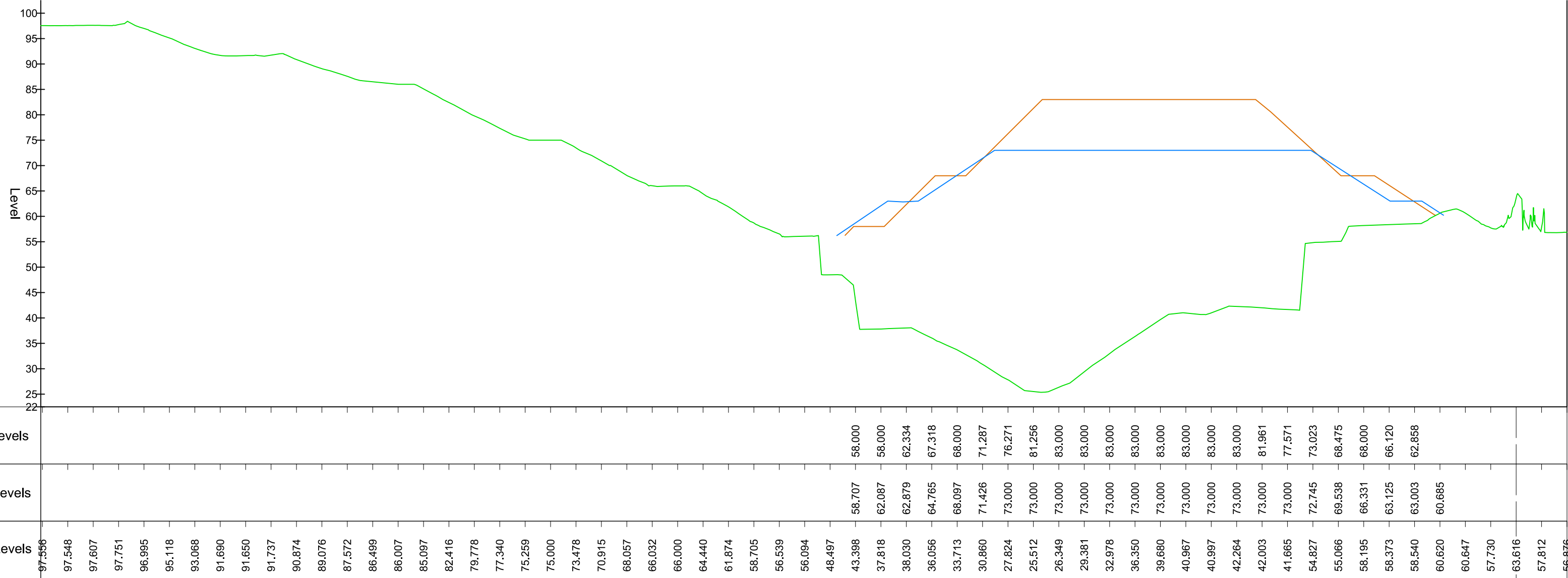
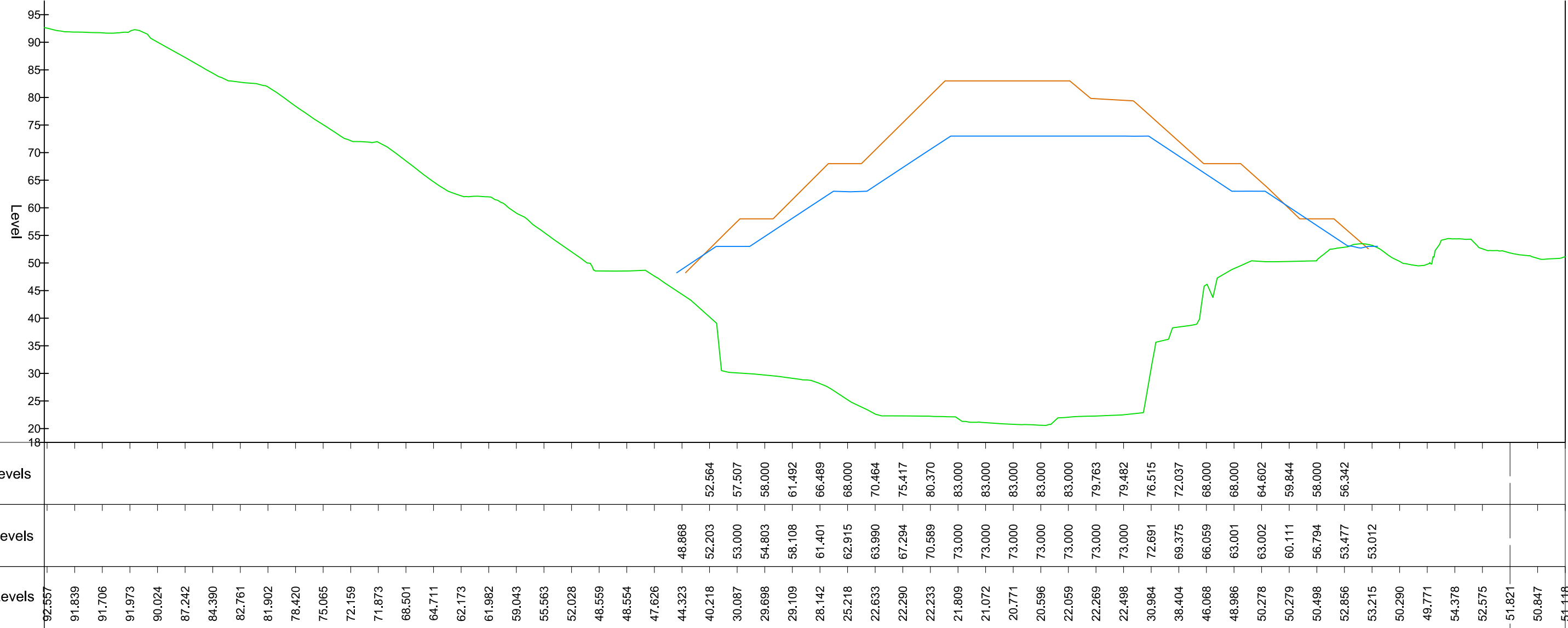
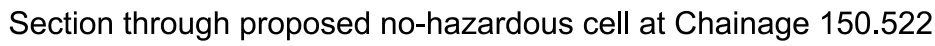
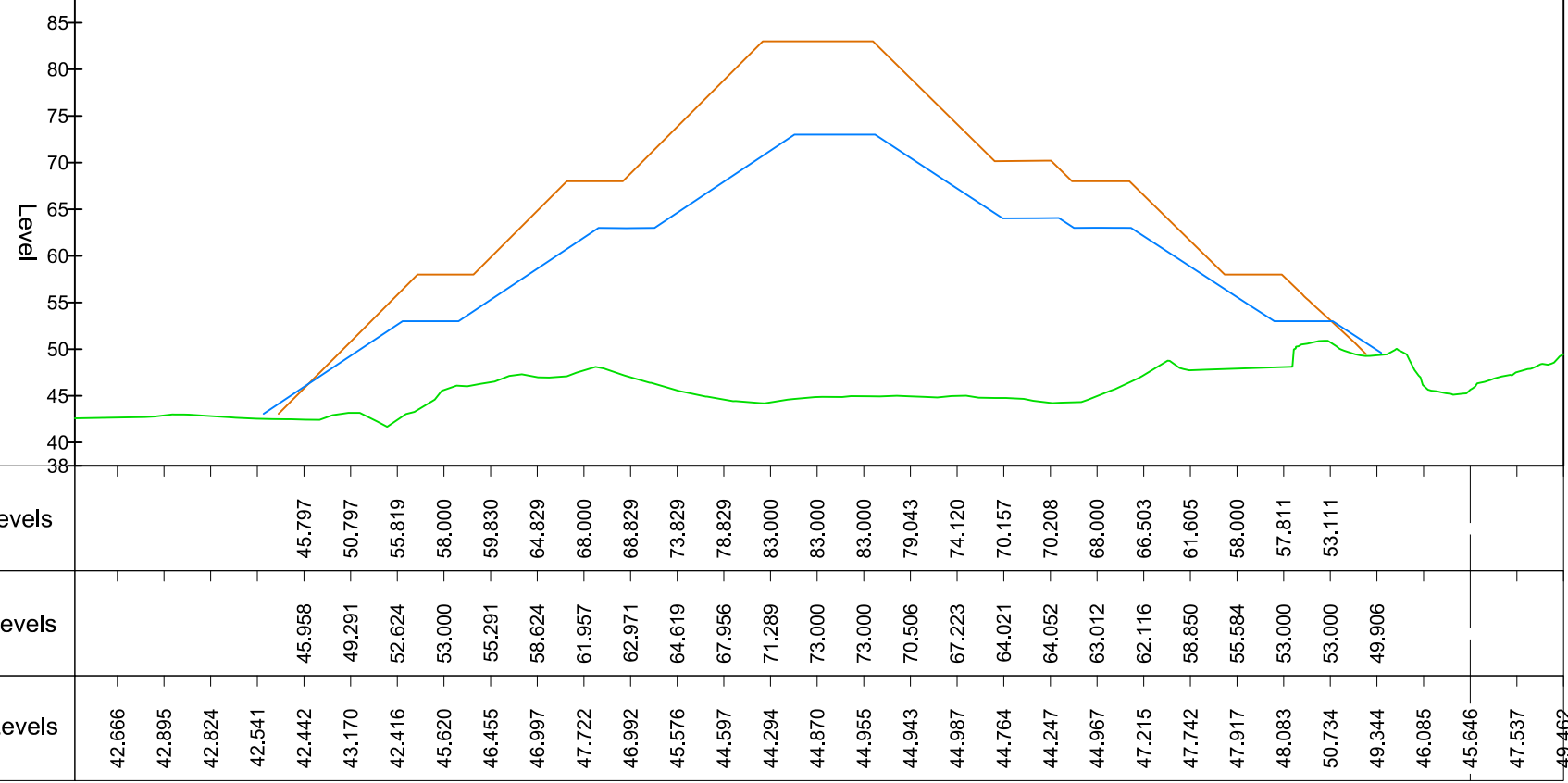
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SCALES @ A1	1:1000	DATE	29/11/2019

CQA

CQA International limited

DRAWING NUMBER
30374/WSM/SL/04

REV
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NOTES

LEGEND

Pre- settlement surface
Post- settlement surface
Existing ground surface

PROJECT TITLE

Construction of a Steep Wall Non-Hazardous Waste Cell

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION

Maghtab Environmental Complex

DRAWING TITLE

Sections

REVISIONS

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Rev	Date	Chkd	Description

DESIGNED	RWS	DRAWN	RWS
SCALES @ A1	1:750	DATE	29/11/2019

CQA
CQA International limited

DRAWING NUMBER
30374/WSM/SL/05

REV
00

Material specifications are presented in the document: 30374 Conceptual design statement



PROJECT TITLE

Construction of a Steep Wall Non-Hazardous Waste Landfill

PROJECT NUMBER

30374

CLIENT

Wasteserv Malta Ltd.

LOCATION
Maghtab Environmental Complex

DRAWING TITLE

Steepwall & Basal Liner System Construction Details

REVISIONS

0	17/03/2020	DB	First issue
Rev	Date	Orkd	Description

DESIGNED	RWS	DRAWN	RWS
SCALES @ A1	As Shown	DATE	17/03/2020

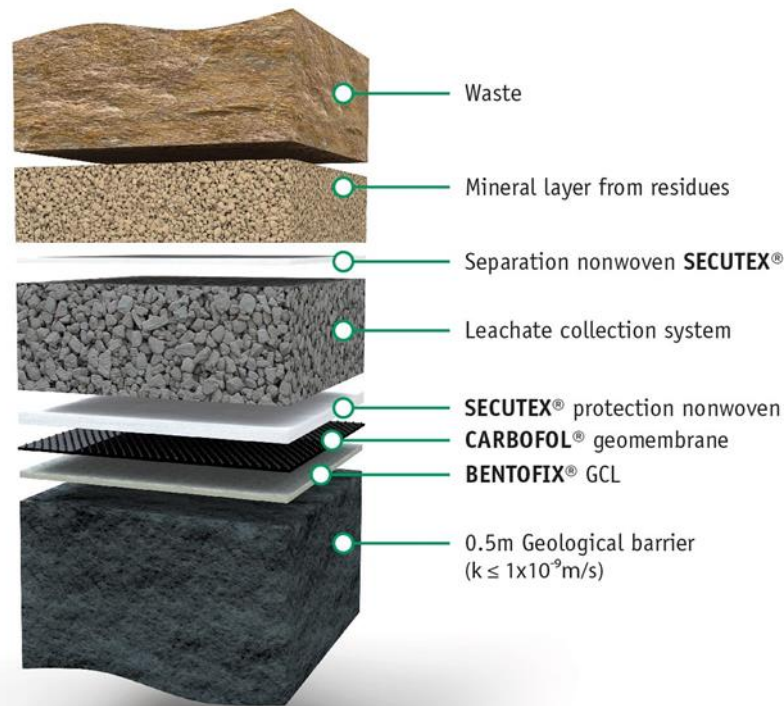
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CQA International limited

DRAWING NUMBER	REV
30374/WSM/SW/FD/12	00

34. The structure of the vertical lining system is best understood by considering the methodology applied for installation of this system. This employs the following processes:
- i. **Process 1** (see plan 4) involving:
 - a. The laying of an engineered basal mineral liner at the base of the cell;
 - b. The construction of metal frame sections anchored into the vertical rock cliff face, supporting a galvanised wire mesh parallel to the cliff face (see plan 9 for details);
 - c. The creation of a mineral liner wedge at the foot of metal structure as a basis for the liner systems to be installed in the following processes.
 - ii. **Process 2** (see plan 5) involving the deposition of mineral liner between the cliff face and the steel mesh in one metre lifts;
 - iii. **Process 3** (see Plan 6) involving the deployment of a protection textile and HDPE² liner outside the steel mesh of the metal frame sections and the engineered basal mineral layer;
 - iv. **Process 4** (see plan 7) involving:
 - a. Fusion welding of the HDPE layer hung from the steel mesh with that deployed over the engineered basal mineral liner;
 - b. The placement of a protective textile over the HDPE layer on the floor of the cell;
 - c. The placement of a level 50cm drainage layer of local mineral material; and
 - d. The placement of baled processed waste from the Malta North plant, to form a protective layer for the steepwall structure. This waste will consist of rejects from the Malta North plant, screened from the presence of wood, glass or metals, and be used in lieu of construction materials.
 - v. **Process 5** (see Plan 8): the progressive raising of the protective baled waste in three metre lifts, with waste infilling between lifts.
35. **Bottom liner and geological barrier:** the bottom liner and geological barrier (see image 4 and plan 14) shall be laid as per the requirements of the Landfill Regulations S.L. 549.29 and the Counl Directive 1999/31/EC on landfilling of waste, where the mineral layer shall be of a minimum of 50cm, and consist of a bentonite-enhanced concrete grout on the vertical sides, and a Geosynthetic Clay Liner (GCL) on the bottom, both having the required permeability of 1.0×10^{-9} m/s. A non-woven geotextile (400g/sq.m) will be laid on top, and form the base on which the foundations (described above) will be laid.

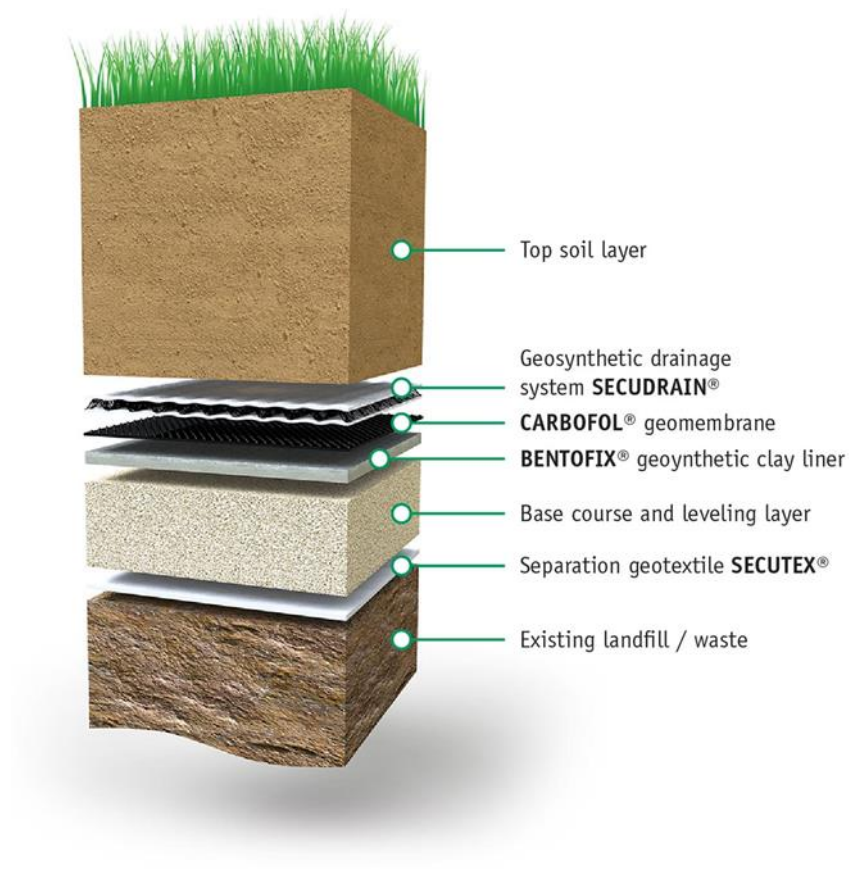
² High-Density Polyethylene

Image 4: section through proposed landfill bottom liner system (source CQA International Ltd)



36. **Gas and leachate collection:** the new landfill cells will allow for linkage with the existing gas and leachate collection systems for treatment. Further leachate treatment systems are in the process of being developed, and will be the subject of a variation to the IPPC permit for the site.
37. **Landfill capping and restoration levels:** the area covered by the new retaining wall will include the following capping materials, as per the requirements of the European landfill directive: a multilayer outer portion consisting of an outer covering layer, a geocomposite drainage layer for rainwater, an impermeable mineral layer, and an inner geocomposite drainage layer for landfill gas (see image 5). Plans 9 to 13 illustrate the final restoration levels after capping; it is envisaged that after the landfill mass settles, the height of the landfill will decrease by circa 10m (inclusive of all liners and capping).

Image 5: section through proposed landfill capping (source CQA International Ltd)



38. **Services, water, foul water sewers, surface water drainage (including storm water drainage), and energy sources:** this project shall not involve any changes in existing services, foul water management, and energy sources barring equipment used for construction. Storm water management is incorporated in the project design; a pipeline for capture of storm waters will be laid over the surface structures. and shall be linked up with existing provision on site as considered within IP0001/06/B.

Process of Construction and Project Duration

39. The construction of the landfill will involve:

- i. Completion of the removal and export of the RDF stockpiled within the hazardous cell;
- ii. Completion of the excavation of the hazardous cell to reach the depths indicated by Plans 1 & 2; and
- iii. Construction of the vertical wall lining system and associated engineering works as described previously.

A Construction Management Plan will be formulated, to expand further on the scope of works and the associated environmental, health and safety requirements.

40. **Implementation phases – raw materials, energy, employment:** no raw materials will be used besides the liners and geocomposite materials described in the previous sections, and the waste mass itself. Energy consumption will be limited to the fuel needed for the heavy vehicles required to excavate the void space, and to move and compact the wastes. This project is expected to involve between 15 – 30 people, who would be involved throughout all the processes described above. Machinery to be used will be excavators, trucks, and compaction vehicles.

41. **Wastes used as construction materials:** waste proposed for use in the steepwall construction will be baled reject wastes from landfill pre-treatment processes, possibly including RDF or contaminated soils (where the latter conform to the waste acceptance criteria of a non-hazardous landfill). The pre-treatment processes shall eliminate wood, metal or glass items. The baled waste will form a highly suitable construction material in the steepwall construction that will replace natural quarried materials which may have another purpose and should be diverted from landfill wherever possible. The material will form a suitable protection layer, and reduce the quantity of material which would otherwise be shipped overseas at high environmental and economic cost.

42. **Waste generated:** the wastes generated in this project are expected to be the volume of inert waste generated by the excavation process. Efforts will be made to reutilise the material within other development projects within or directly adjacent to the Maghtab Environmental Complex, or as daily cover on the landfill tip faces or restoration contouring. This may require the deployment of crushing equipment on site to process the material, to ensure that this is fit for purpose.

As of December 2019, 47,900m³ of RDF material stored on site and circa 316,000m³ of rock have been removed from site and sent to licenced facilities. The remaining quantity of RDF for export is 25,900m³; circa 638,000m³ of rock is left to be excavated. Depending on the quality of the excavated material it will either be used as a constituent in the concrete production or for another use within the construction industry. Using such material for the backfill of quarries will only be chosen as a last resort.

43. **Access requirements:** these will be serviced by internal roads currently available within the Maghtab complex, together with the additional route highlighted in Plan 1. The project may involve the creation of additional access routes traversing the waste mass itself, as is currently required by logistic requirements of the waste deposition process.
44. **Project duration:** total duration of works is expected to be of about three to four years depending on landfilling rates, which will ultimately determine the rate of progress required for development of the steep wall system in lifts.

Environmental Risks, Impacts & Mitigation

45. An environmental impact may be positive, neutral or negative, depending on the effect a causative agent would have on the environment. Impacts would be:
- **Positive** where the overall environmental aspect or medium would be improved or enhanced;
 - **Negative** where an impact would reduce the overall quality of an environmental aspect or medium; and
 - **Neutral** where the effect of the causative agent would not be relevant to the environmental aspect or medium, or not leave an impact that is discernible in terms of scale of change.
46. Impacts from this project can arise from either of two stages:
- A. The **construction phase**, which is where the void space is being excavated and the required engineering works for the liner system and base are being installed;
 - B. the **operational stage**, which is that where the landfill is being recontoured and waste infilled, and
 - C. the **post-operational stage** where the landfill mass has been formed and capped, and is being maintained.
47. The environmental risks associated with the project are listed in Table 2 overleaf, together with the mitigation measures that are proposed to manage and mitigate such impacts.

Table 2: environmental risks posed during the development and operational & post-operational processes, and relevant mitigation measures

Risk	Risk: construction	Risk: operational	Risk: Post-construction	Mitigation measure
Land use	Site already committed as landfill	Site already committed as landfill	Possible re-use of site	<ul style="list-style-type: none"> the use of vertical liner systems to maximise void space allow for potential after use of site
Biodiversity	Site already committed and developed	Site already committed and developed	Site already committed & developed	<ul style="list-style-type: none"> Not applicable
Stability	Subsidence and landslide during excavation & placement of support structures	Subsidence and landslide during infilling of waste	Subsidence and landslide	<ul style="list-style-type: none"> Stability Risk Assessment to identify risks and design accordingly Method statement for excavation and laying of foundations, to avoid destabilisation, stipulating excavation process required to control areas at risk of destabilisation Deposition of waste in layers Quality Assurance processes
Dust	During excavation	During transport of wastes on haul roads	On haul roads	<ul style="list-style-type: none"> Monitoring of wind speed and direction prevalent in the works area Use of fog cannon on site during works as dust abatement Wastes will be covered with daily cover: either inert material or a geosynthetic layer Specific environmental monitoring
Odour & other emissions	Not applicable	Odour from vehicles and tip face	Not applicable	<ul style="list-style-type: none"> Monitoring of wind speed and direction prevalent in the works area Use of fog cannon on site during works as dust abatement Use of daily cover on tip face
Contamination of surface or ground waters	Contamination of storm and ground waters from operational vehicles or inert stockpiles	Contamination of storm or ground waters from waste or leachate	Failure of integrity of basal landfill liner compromising leachate retention systems	<ul style="list-style-type: none"> Proper maintenance of vehicles & spill kits Containment of waters on haul roads Silting ponds to prevent silt runoff Proper design and quality assurance of landfill liner

Risk	Risk: construction	Risk: operational	Risk: Post-construction	Mitigation measure
Ground contamination	Operational spills	Failure of integrity of basal landfill liner compromising leachate retention systems	Failure of integrity of basal landfill liner compromising leachate retention systems	<ul style="list-style-type: none"> Stability Risk Assessment to ensure liner stability Landfill liner design to prevent possibility of liner rupture Liner protection through careful deposition of foundation materials & preventing heavy vehicles from driving directly on liner Quality Assurance processes for liner and leachate collection systems Maintenance of vehicles to prevent operational spills, and maintenance of spill kits on site to cater for accidents
Visual impact	View of construction site	View of operational landfill	View of capped landfill	<ul style="list-style-type: none"> Sensitive design of landfill height and capping
Waste Management	Generation of excavation wastes	Provision of essential waste management service	Not applicable	<ul style="list-style-type: none"> Reclamation and use of excavation waste wherever possible, by being given a use within the construction industry wherever possible
Fire & exposure of potential hotspots	Accidental fire to vehicle	Landfill fire	Landfill fire	<ul style="list-style-type: none"> Assessment of risk through visual inspection and thermographic cameras to detect hotspots Hotspot management using leachate and/or water to dissipate heat in buried landfill mass Fire management plan Maintenance of stockpiles of inert material and necessary plant to respond to fire risk
Traffic	Vehicles associated with construction are expected to be a continuation of the current scenario in terms of works on Ghallis.	As per current scenario, with additional tip faces in use	As per current scenario for as long as Maghtab Environmental Centre accepts waste	<ul style="list-style-type: none"> traffic management within the Maghtab Environmental Complex

48. These may be summarised as follows:

- **Land use:** given the uptake and effective sterilisation of land has already been implemented during past development, the impact on land use is considered to be **neutral**.
- **Biodiversity:** the impact on land use is expected to have no repercussions on the biodiversity given that the use of the site is already committed to waste management activities, and no significant biodiversity is present on site; the impact is expected to be **neutral**.
- **Stability:** this project proposal is underpinned by a Stability Risk Assessment; consequently, this impact is expected to be **neutral** over the longer term.
- **Dust:** the impact is expected to be **slightly negative** during the construction phase, but the overall emissions should not increase over that currently experienced.
- **Odour & other emissions:** these are expected to be comparable to those of the existing landfill operations currently approved – this impact is expected to be **neutral** over the longer term in that it is essentially a continuation of current practice.
- **Generation of leachate:** this is expected to be comparable to that of the existing landfill operations currently approved; this impact is expected to be **neutral** over the longer term in that it is essentially a continuation of current practice, and further leachate treatment facilities are planned.
- **Ground & groundwater contamination:** these are expected to be comparable to that of the existing landfill operations currently approved; this impact is expected to be **neutral** over the longer term in that it is essentially a continuation of current practice in a site approved for such use.
- **Visual impact:** the extent to which interventions on the Ghallis landfill would be visible from external viewpoints would be limited requires careful evaluation to ensure that the eventual landform does not impact unduly on the landscape. This impact is expected to be **slightly negative** over the longer term – see following sections for a more detailed assessment with photomontages.
- **Waste management:** the objective of this proposal is the gain in void space at the Ghallis landfill, which would allow for the development of further waste management solutions for non-hazardous waste streams currently being deposited in this site - this impact is expected to be **positive** over the longer term.
- **Fire & exposure of potential hotspots:** this impact is expected to be **neutral** over the longer term in that it is essentially a continuation of current practice.
- **Traffic:** Changes in traffic are expected to be rerouting of existing traffic upon entry into the Maghtab Environmental Complex this impact is expected to be **neutral** over the longer term in that it is essentially a continuation of current practice. Traffic related to transport of wastes is expected to be constant, varying only with changes in generation patterns. The only difference will be the need to reroute traffic to different tip faces within the landfill complex.

49. The above environmental risks shall also be managed through the following:
- Health and safety risk assessments - further elaboration on the existing assessments and plans to include this project in scope
 - Method statements for the various processes
 - Stability assessments
 - fire risk assessment and management plan - further elaboration on the existing assessments and plans to include this project in scope
50. **Cumulative impacts:** the operational risks detailed above are expected to be transient, and reversible in that they are limited in duration to the engineering works involved in the construction works, and the infilling operations. The environmental impacts created are expected to be consistent with those currently experienced at the existing landfill complex. However, application of the mitigation measures indicated above, also through adherence to the conditions of the IPPC permit requirements, should serve to mitigate these risks.
51. **Environmental monitoring:** this will be required through all stages. The current monitoring programme includes H₂S, CH₄, VOCs, PMs, etc. A review of the monitoring programme indicates that the monitoring parameters employed are compatible with the monitoring requirements of this proposal.

Stability

52. The development of the proposal for new landfill cells involves the use of innovative techniques that are directed towards the maximisation of void space that could be gained through the development. These techniques utilise engineering principles to allow the development of landfill slope and liner systems that are stable at profiles that are steeper than the traditional 45-degree angles that have been employed in local landfilling to date.
53. In parallel with the development of the detailed engineering design proposals, landfill stability is being assessed as part of a Stability Risk Assessment (SRA). This SRA will consider the original studies carried out for the Ghallis landfill (including the hazardous cell) by SLR in 2004, and model the behaviour of the proposed structures through the development of a Conceptual Stability Site Model, that includes the following:
- i. **Basal Sub-Grade Model** to evaluate the stability of the foundations and underlying substratum (rock), where settlement is expected to be minimum and negligible;
 - ii. **Basal Lining System Model** to evaluate the stability and consequent integrity of the proposed lining system, to ensure continued containment of the waste mass and leachate collection;
 - iii. **Waste Mass Model** which evaluates the behaviour of the waste mass as part of the structure, in terms of the quality of the waste, the tendency with respect to settlement; and
 - iv. **Capping System Model & Side Slope Lining System Model** which sets the parameters that need to be met by the structures being proposed, in terms of stability and containment.
54. The various models described above have been screened in terms of risk as part of assessment process. Risks identified were correlated with mitigation measures that would be required either in terms of management of operations, or design of structures. Structural designs were evaluated in terms of the reinforcements required (as described in the plans presented previously), and the physical properties pertinent to the various materials.

Visual Impact

55. Given the history of the Maghtab Environmental Complex, visual impact assessment should consider the various developments that have taken place over an appreciable span of time. These include:
- i. The original development of the Maghtab land-rise in 1977, infilling the natural landforms that existed previously, and forming a waste mound which is now the dominant landscape feature in the Maghtab area;
 - ii. The developments of the Zwejra and Ghallis landfills, which together allowed for the permanent closure and capping of the Maghtab land-rise;
 - iii. The development of the Malta North waste management facilities and ancillary infrastructure; and
 - iv. The recontouring of the eastern boundary of the Ghallis landfill using proprietary engineering techniques that will allow the gain of additional landfill void space.

The proposed development of a Waste to Energy Plant just outside the eastern border of the Maghtab Environmental Complex is a further development which is currently undergoing visual impact assessment in its own right, as required under the provisions of the Environmental Impact Assessment regulations.

56. The nature and extent of visual impacts arising from the Maghtab national waste management complex have been evaluated previously in the *Master Plan for the Maghtab Environmental Complex - Environmental Impact Statement Update prepared in support of development permit Application No. PA 02342/06* (Adi Associates Environmental Consultants Ltd, 2011). This study, and the reference points used for the assessment of visual impact, constitute an important reference point for the evaluation of new projects, to allow accurate monitoring of the changes in visual impact over time.
57. The process of development of the proposed project has considered the results of the above study; further studies have been conducted to direct the development of the final form of the project, so as to optimise mitigation of visual impact as far as possible during the design phase. However, it needs to be considered that the formation of a landfill mass (and indicative restoration levels) had already been considered as part of the development permitting process that approved the landfill complex including the hazardous cell. The extension of the approved cell is towards the south and centre of the landfill complex; consequently, the visual massing of this extension is largely masked by existing and/or approved restoration levels.

58. The study carried out in 2011 defined a Zone of Visual Influence (see Plan 14) to assess the impact of the Maghtab Environmental Complex as approved for the Malta North facilities (PA 02342/06 and PA 00964/11). This Zone of Visual Influence (ZVI), and viewpoints selected on this basis of this ZVI, were reused to generate a further set of photomontages that would allow assessment of visual impact for the recontouring of the Ghallis landfill (PA 1586/18). These photomontages were generated as required by the Planning Authority's *Best Practice Guide - Visual Simulations* by Perit Joseph Pace of Virtual Reality Studios Ltd., and these are attached as Appendix A.
59. Given feedback received during the processing of PA 1586/18, a further viewpoint 15 was added:
60. A list of viewpoints is provided in Table 3, which itemises the various locations from which the photographs were taken, and describes the extent to which the proposed extension is visible in the photomontages provided. Appendix A includes:
 - Photographs of all viewpoints listed in Table 3 in their present form (labelled as existing);
 - Photomontages (labelled as wireframe) showing superimposed 3D models generated via a Digital Terrain Model, where the remaining approved void space is shown in green, and the approved extension is shown in pink, and restoration of the proposed cells in blue; and
 - Photomontages (labelled proposed) of the final proposed landfill terrain (showing both approved and proposed landfill infill), with a render derived from that of the Maghtab landfill.
61. The proposed extension to the landfill is visible from the following points:
 - Point 1. Wardija: view of St. Paul's Bay and Burmarrad plains, with Maghtab landfill in the distance
 - Point 2. Triq il_Qawra Promenade, Bugibba
 - Point 3. Triq il_Luzzu, Qawra, facing Salina Bay
 - Point 4. Adjacent to Coastline Hotel
 - Point 5. Farm to the north of Ghallis landfill
 - Point 8: Sqaq tax-Xaqquf, Gharghur: view of Burmarrad with St. Paul's Bay in the distance; Maghtab landfill
 - Point 12: Triq Ghaxqet I-Ghajn, I/o Gharghur: view of Maghtab and rural surroundings, with Maghtab landfill and St. Paul's bay in the distance
 - Point 13. Triq John Adye, T'Alla u Ommu: rural landscape surrounding Maghtab Environmental Complex and industrial development
 - Point 14 Triq I_lmsaqqfin, Mosta: rural landscape surrounding Maghtab Environmental Complex and industrial development

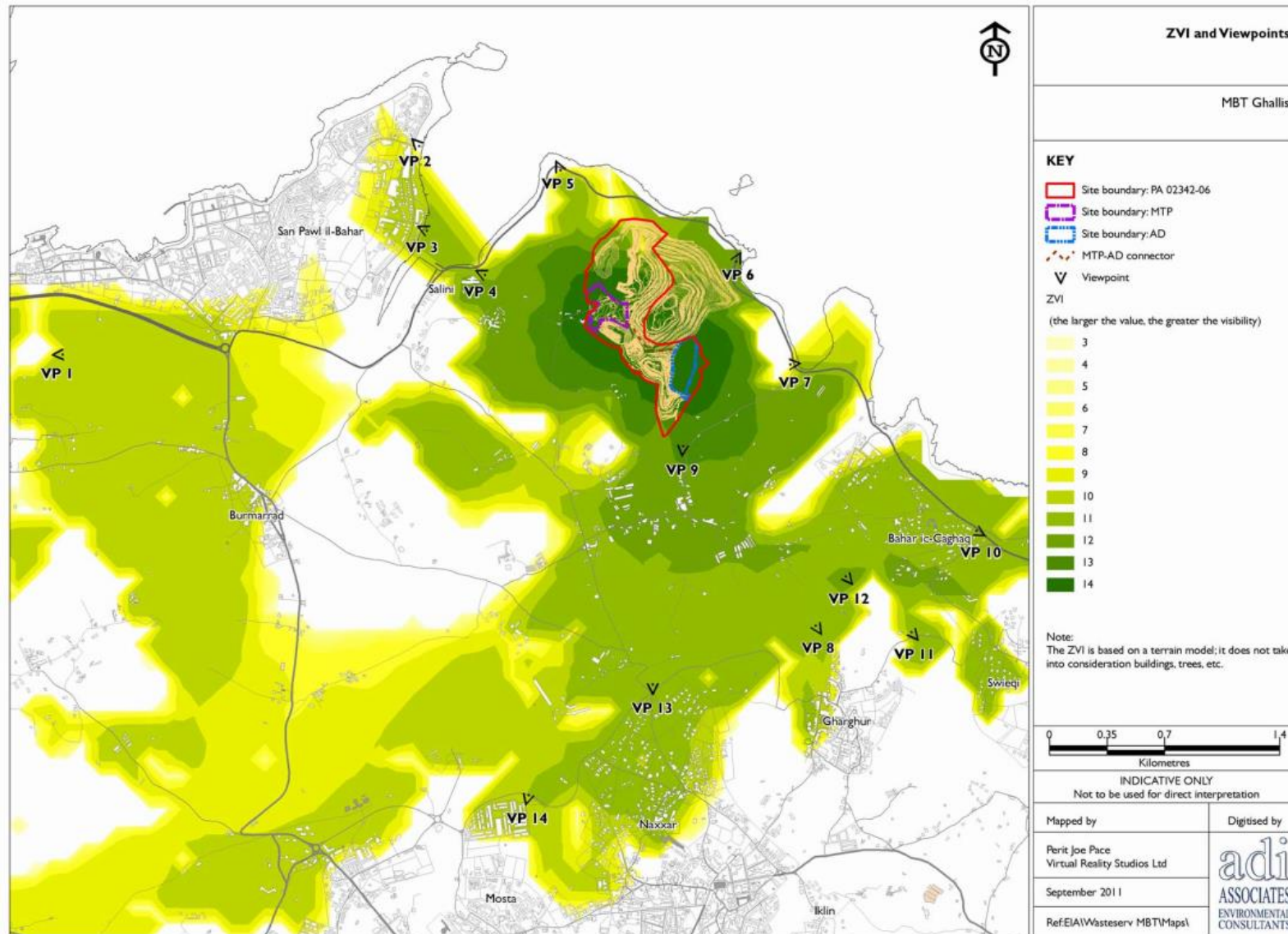
Table 3: list of viewpoints and description of impact of existing approved landfill, and proposed landfill extension

Viewpoint	Location	Visible (Y/N)	Description of Impact of approved landfill mass	Description of Impact of proposed extension
1.	Wardija: view of St. Paul's Bay and Burmarrad plains, with Maghtab landfill in the distance	Y	Approved landfill mass extends further to the north in terms of impact on the skyline.	Proposal has Maghtab as a backdrop; visible extent of extension is extremely limited.
2.	Triq il_Qawra Promenade, Bugibba: view of sea, and coastal area dominated by Maghtab landfill	Y	Approved increase in landfill mass has Maghtab as a backdrop.	Proposal has Zwejra and the Naxxar skyline as a backdrop; extent of extension on the skyline is limited.
3.	Triq il_Luzzu, Qawra, facing Salina Bay	Y	Approved landfill mass extends further to the eastern side of Salina Bay in terms of impact on the skyline.	Proposal has Zwejra as a backdrop; the final result in an incremental increase in massing against the skyline.
4.	Adjacent to Coastline Hotel	Y	Approved landfill mass extends further to the eastern side of Salina Bay in terms of skyline.	Proposed visible extent of landfill mass extends in the direction of the eastern side of Salina Bay in terms of impact on the skyline. Mass of the proposed restoration impinges on the skyline.
5.	Farm to the north of Ghallis landfill	Y	Approved landfill mass directly behind the farm.	Proposed landfill mass circa 300m away from the farm and clearly visible.
6.	North part of Coast Road	N	Approved landfill mass increases existing massing of landfill	Proposal not visible from this viewpoint.
8.	Sqaq tax-Xaqquf, Gharghur: view of Burmarrad with St. Paul's Bay in the distance; Maghtab landfill	Y	Behind Zwejra landfill – change is barely perceptible	Behind Zwejra landfill – impinges incrementally on the distant view of St. Paul's Bay.
12.	Triq Ghaxqet l-Ghajn, l/o Gharghur: view of Maghtab and rural surroundings, with Maghtab landfill and St. Paul's bay in the distance	Y	Behind Zwejra landfill – change is barely perceptible	Behind Zwejra landfill – impinges incrementally on the distant view of St. Paul's Bay.
13.	Triq John Adye, T'Alla u Ommu: rural landscape surrounding Maghtab Environmental Complex and industrial development	Y	Behind Zwejra landfill – Malta North visible	Proposed landfill mass extends further to the north in terms of skyline.
14.	Triq l_Imsaqqfin, Mosta: rural landscape surrounding Maghtab Environmental Complex and industrial development	Y	Behind Zwejra landfill – Malta North visible	Proposed landfill mass extends incrementally further to the north in terms of impact on the skyline, but is superimposed on approved landfill mass.
15	Naxxar: junction between Triq ilGhallis and Trejjet l-Irziezet	Y	Directly facing the landfill complex	An increase in massing against the skyline

62. **Viewpoints where the landfill complex as a backdrop:** the proposed development has the landfill complex as a backdrop for most viewpoints. While the new landfill cell will be visible in terms of line of sight, this would not be immediately obvious given the existing landfill mass in the background. Although the rural setting of these viewpoints is deemed sensitive, the changes would tend to be restricted to the view of the Maghtab waste management complex. The most visible changes will be from closer range views, but these would have been affected in this manner by the original hazardous landfill, given that the extension was towards the south of cell, and within the centre of the Maghtab Environmental Complex. Given a final finish that is comparable to that of the existing landfill masses, the overall changes to the landscape would be imperceptible, and consequently the visual impact would not be significant.
63. **Viewpoint where the proposed development impinges slightly on the skyline in terms of height:** this is the case for viewpoints 3, 4, 5, 13, 14 & 15 from the regions immediately around Ghallis (i.e. from near the Coastline Hotel, the Coast Road, and from the north), and more distant views from Mosta and Naxxar. While the extension will be visible in terms of line of sight, this will be restricted to a limited elevation of the existing landfill mass against the skyline. This increment would generally have resulted had the original landfill cell not been extended. Although the setting of this viewpoint is generally rural, the existing mass of the Maghtab waste management complex is a dominant backdrop. Given a final finish that is comparable to that of the existing landfill masses, the overall changes to the landscape would be an increment over the existing situation, and consequently the visual impact would be of limited significance.
64. **Viewpoint where proposed development impinges on the skyline in terms of lateral extension:** with respect to viewpoints 13 & 14 (from T'Alla u Ommu and Mosta) the extension will be visible in terms of line of sight, and this will consist of an elevation of the existing landfill mass against the skyline. The panoramic views are considered sensitive, even though the general rural is dominated by the Maghtab landfill and industrial development in the foreground. It is pertinent to note that these impacts would have resulted from the development of the hazardous cell, given that the most significant extensions onto the skyline are generally in a northern direction. Given a final finish that is comparable to that of the existing landfill masses, the overall change to the landscape would be an increment of the existing visual impact, and is deemed moderate in terms of magnitude and extent.




65. Assessment of visual impact needs to give due consideration to landfill mass that is already permitted via development permits that are currently being implemented. This would include the development of the original hazardous cell, had its original purpose been implemented. Consequently, the overall impact in visual terms is deemed to be slightly negative, mainly due to the development of the landfill mass already approved in the original development permit application.

Plan 14: Zone of Visual Influence as defined in the EIA update carried out by Adi Associates Environmental Consultants Ltd, (2011). *Master Plan for the Magtab Environmental Complex. Environmental Impact Statement Update prepared in support of development permit Application No. PA 02342/06.*



Appendix A: Photomontages

Legend for following photomontages:

	Approved landfill volume still to be infilled
	Landfill recontouring approved via PA 01586/18
	Landfill volume proposed by PA 03144/19



VIEWPOINT REFERENCE 1 Year 0 / 10 Distance to proposed development: 3.35 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1206 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA
EXISTING VIEW



VIEWPOINT REFERENCE 1 Year 0 / 10 Distance to proposed development: 3.35 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1206 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 1 Year 0 / 10 Distance to proposed development: 3.35 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1206 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

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VIEWPOINT REFERENCE 2
EXISTING VIEW

Year 0 / 10 Distance to proposed development: 1.47 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1226 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA



VIEWPOINT REFERENCE 2 Year 0 / 10 Distance to proposed development: 1.47 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1226 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 2

Year 0 / 10 Distance to proposed development: 1.47 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1226 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 3
EXISTING VIEW

Year 0 / 10 Distance to proposed development: 1.19 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1234 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA



VIEWPOINT REFERENCE 3 Year 0 / 10 Distance to proposed development: 1.19 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1234 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 3 Year 0 / 10 Distance to proposed development: 1.19 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1234 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

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VIEWPOINT REFERENCE 4
EXISTING VIEW

Year 0 / 10 Distance to proposed development: 698 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1244 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA



VIEWPOINT REFERENCE 4 Year 0 / 10 Distance to proposed development: 698 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1244 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 4

Year 0 / 10 Distance to proposed development: 698 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1244 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 5 Year 0 / 10 Distance to proposed development: 329 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1336 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA
EXISTING VIEW



VIEWPOINT REFERENCE 5 Year 0 / 10 Distance to proposed development: 329 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1336 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 5 Year 0 / 10 Distance to proposed development: 329 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1336 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 6
EXISTING VIEW

Year 0 / 10 Distance to proposed development: 329 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1259 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA



VIEWPOINT REFERENCE 6 Year 0 / 10 Distance to proposed development: 329 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1259 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 6 Year 0 / 10 Distance to proposed development: 329 m Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1259 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 8
EXISTING VIEW

Year 0 / 10 Distance to proposed development: 2.31 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1359 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA



VIEWPOINT REFERENCE 8 Year 0 / 10 Distance to proposed development: 2.31 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1359 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 8 Year 0 / 10 Distance to proposed development: 2.31 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1359 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 12 Year 0 / 10 Distance to proposed development: 2.15 Km Camera height: 1.5m Date / time of photograph: 19-Jun-2017 ; 1433 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA
EXISTING VIEW



VIEWPOINT REFERENCE 12 Year 0 / 10 Distance to proposed development: 2.15 Km Camera height: 1.5m Date / time of photograph: 19-Jun-2017 ; 1433 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 12 Year 0 / 10 Distance to proposed development: 2.15 Km Camera height: 1.5m Date / time of photograph: 19-Jun-2017 ; 1433 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 13
EXISTING VIEW

Year 0 / 10 Distance to proposed development: 2.36 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1318 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA



VIEWPOINT REFERENCE 13 Year 0 / 10 Distance to proposed development: 2.36 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1318 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 13 Year 0 / 10 Distance to proposed development: 2.36 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1318 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 14 Year 0 / 10 Distance to proposed development: 3.1 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1324 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA
EXISTING VIEW



VIEWPOINT REFERENCE 14 Year 0 / 10 Distance to proposed development: 3.1 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1324 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 14 Year 0 / 10 Distance to proposed development: 3.1 Km Camera height: 1.5m Date / time of photograph: 29-Sept-2017 ; 1324 Camera type: EOS 5DS; VFOV: 27deg HFOV: 39.6deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only



VIEWPOINT REFERENCE 15 Year 0 / 10 Distance to proposed development: 636 m Camera height: 1.5m Date / time of photograph: 26-Mar-2019 ; 1305 Camera type: EOS 5DS; VFOV: 46.4deg HFOV: 65.5deg Sheet number: NA
EXISTING VIEW



VIEWPOINT REFERENCE 15 Year 0 / 10 Distance to proposed development: 636 m Camera height: 1.5m Date / time of photograph: 26-Mar-2019 ; 1305 Camera type: EOS 5DS; VFOV: 46.4deg HFOV: 65.5deg Sheet number: NA

PROPOSED VIEW (COLOUR CODED)

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VIEWPOINT REFERENCE 15 Year 0 / 10 Distance to proposed development: 636 m Camera height: 1.5m Date / time of photograph: 26-Mar-2019 ; 1305 Camera type: EOS 5DS; VFOV: 46.4deg HFOV: 65.5deg Sheet number: NA

PROPOSED VIEW

The image contained on this page is not representative of scale and distance from the actual viewpoint and shows the proposed development in its context only