WASTE RECOVERY PLAN

Tovil Quarry, Maidstone

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Waste Recovery Plan
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Quality Management

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1 INTRODUCTION

1.1 Overview

1.1.1 RPS has been instructed by P J Burke Properties Limited to prepare a waste recovery plan and permit application for a bespoke environmental permit for the deposit of waste for recovery in order to develop Tovil Quarry site in Farleigh Hill, Tovil, Maidstone, Kent.

1.1.2 This document constitutes the Waste Recovery Plan in support of a formal application for an environmental permit for a waste recovery activity allowing the permanent deposit of waste on land for construction or land remediation.

1.1.3 Current planning permission for the site allows for the erection of 272 No. dwellings once the site has been prepared for development.

1.2 Background

1.2.1 The site was previously quarried, and part of the site was subsequently used for landfill until the 1970s. Since being landfilled, the waste materials have been excavated and screened to remove residual wastes and recyclable material for removal off site leaving soils and inert materials to be used in re-profiling and developing the site for future development. As well as the screened materials, there is a substantial volume of site derived quarry waste materials remaining on site from the original quarrying process which will also be utilised in the preparatory works. The site is proposed for residential development and other such erections and infrastructure upon the land.

1.2.2 Pre-application discussions with the Environment Agency (EA) local area environment management team have confirmed that the use of the waste materials for re-profiling and developing the site should be done under the authorisation of a permit for “Use of Waste in a Deposit for Recovery Operation”.

1.2.3 Furthermore, we have had basic pre-application discussions with the EA national permitting team (Pre-Application Reference: EPR/DB3804HF/A001), and they have again advised that the proposed activities will require a bespoke waste recovery permit to progress.

2 SITE DESCRIPTION

2.1 Site Setting

2.1.1 The site is located on the southern side of Farleigh Hill, Tovil approximately 2 km south west of Maidstone town centre. The centre of the site is at approximate grid reference TQ 75103 54110. The site address is:

Tovil Quarry,

Land off Farleigh Hill,

Maidstone,

Kent,

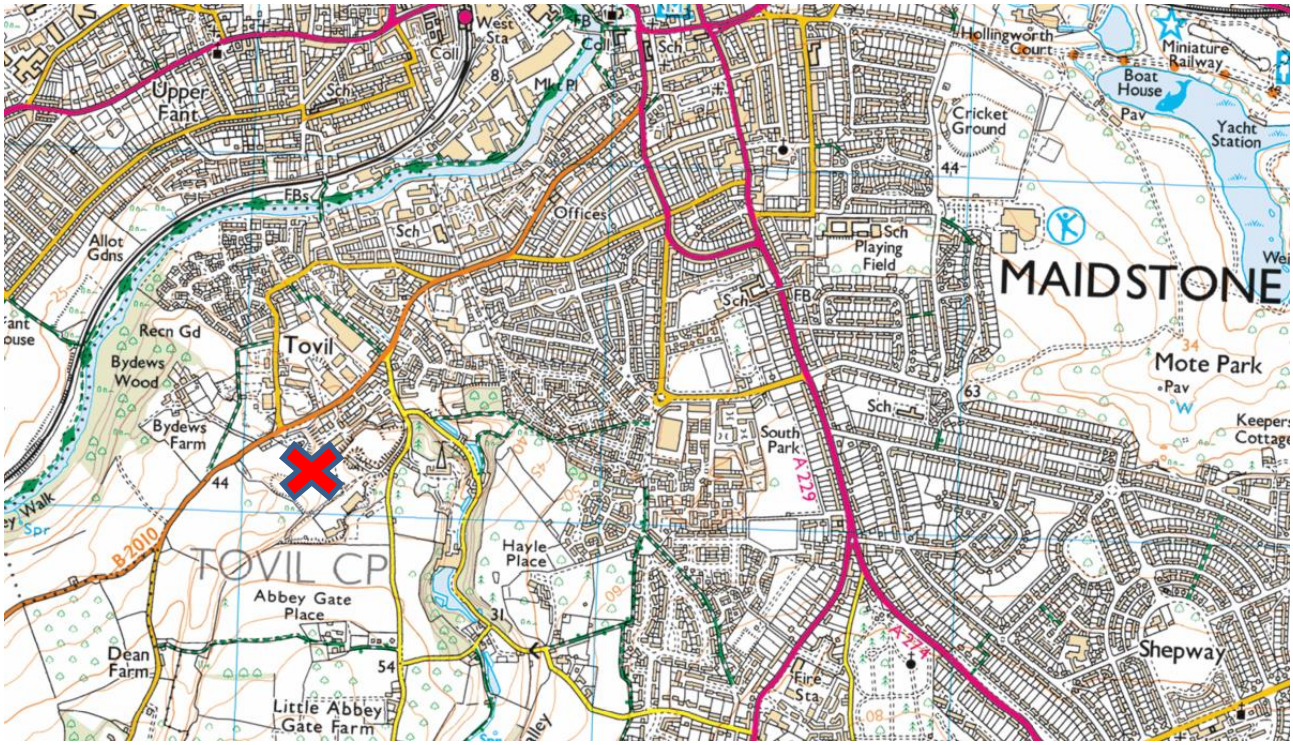
ME15 6RQ

2.1.2 The site is broadly 'L' shaped with dimensions 300 m by 220 m at its largest; the entrance to the site is off Farleigh Hill. There are a number of temporary site buildings located adjacent to the site entrance, along with an area set aside for plant storage and another for car parking. There are no other buildings located on the site.

2.1.3 A proportion of the site area is occupied by waste stockpiles which have been screened from the excavated landfilled materials as well as a substantial volumes of quarry waste materials from the original quarrying process.

2.1.4 The site location is shown marked with a red X in Figure 2.1 below:

Figure 2.1: Site Location



2.1.5 A site plan can be found in **Appendix A**.

2.1.6 The site lies near several nature and heritage conservation sites as shown in Tables 2.1 below:

Table 2-1: Nature and Heritage Conservation Sites

Site Type	Site Name	Screening Distance (m)
Local Wildlife Sites	Loose Valley, Maidstone	<200
Ancient Woodland	Bydews Wood	<200
Ancient Woodland	Unnamed Wood	<200
Ancient Woodland	Unnamed Wood	<200
Local Nature Reserve	River Len	<2,000

2.1.7 The site lies near several protected species as shown in Tables 2.2 below:

Table 2-2: Protected Species

Protected Species	Screening Distance (m)
Brown Trout	Up to 500m
European Eel	
Bullhead	
European eel migratory route	

2.1.8 The site is also located near a Deciduous Woodland protected habitat (<500m).

2.1.9 The site is located on the Lower Greensand Group comprising of the Hythe Formation which overlies the Atherfield Clay Formation. The British Geological Society's 'Geology of Britain Viewer'[1], describes this bedrock group as follows:

- Hythe Formation - Sandstone and [subequal/subordinate] Limestone, Interbedded. Sedimentary Bedrock formed approximately 113 to 126 million years ago in the Cretaceous Period. Local environment previously dominated by shallow seas.
- Atherfield Clay Formation - Sandstone and Mudstone. Sedimentary Bedrock formed approximately 113 to 126 million years ago in the Cretaceous Period. Local environment previously dominated by shallow seas.

2.1.10 The Hythe Beds are classified as a Principal Aquifer (layers of rock or drift deposits that have high intergranular and/or fracture permeability meaning they have the potential to provide a high level of water storage.), and groundwater within the Hythe Beds is expected to flow in a northerly direction towards the River Medway. The underlying Atherfield Clay is a Secondary B aquifer (predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering).

2.1.11 Based on existing records the site does not lie within a groundwater Source Protection Zone associated with an abstraction zone. There are no groundwater or surface water abstractions, including potable ones, within 500m radius.

2.1.12 Groundwater has been recorded at various times in a number of boreholes across the site from 25.7 mbgl to 36 mbgl. Where the Atherfield Clay was exposed in the deepest excavations at the site, the groundwater was generally located only as a slow inflow at the top of the clay, so it concluded that there is little groundwater flow passing through the site.

2.1.13 There are no identified Groundwater Source Protection Zones (GSPZ) within a 2 km radius of the site. The Groundwater Vulnerability Maps show the vulnerability of groundwater to a pollutant

[1] http://mapapps.bgs.ac.uk/geologyofbritain/home.html?

discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre. Groundwater vulnerability in this area is classified as high.

2.1.14 The nearest watercourse is the Loose stream which is located 0.3 km to the east and the River Medway which is located approximately 0.55 km to the north west of the site.

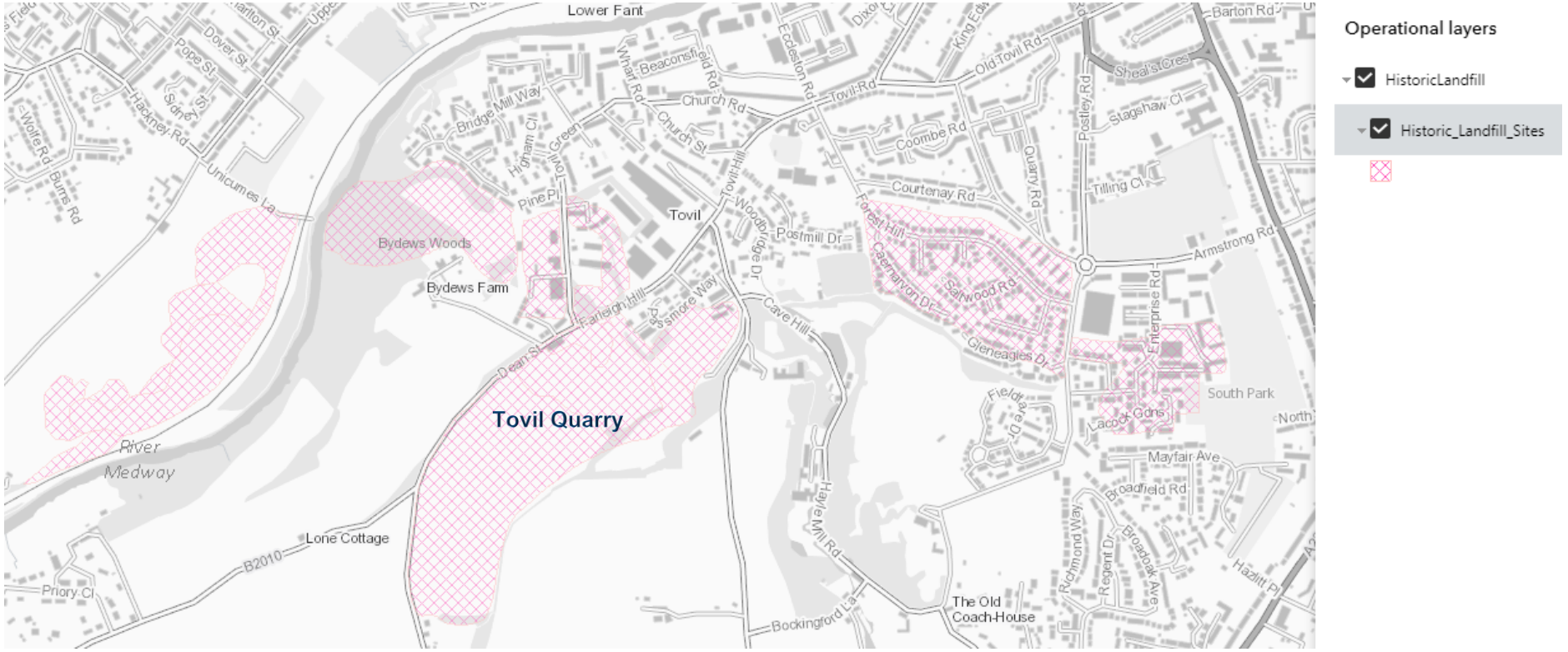
2.1.15 The EA flood risk maps[2] have been consulted and it is shown that the areas of the site to be used for the waste recovery activity are located in flood zone 1, an area with a low probability of flooding.

2.1.16 The DEFRA data services platform[3] has been reviewed for historic landfills and it has been confirmed that there are a number of historic areas of landfill close to the site as shown in Figure 2.2 below.

[2] https://flood-map-for-planning.service.gov.uk/confirm-location?easting=575103&northing=154110&nationalGridReference=TQ7510354110

[3] https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/HistoricLandfill&Mode=spatial

Figure 2.2: Historic Landfills



2.2 Site History

2.2.1 The site is approximately 6.5 Ha in total area and is designated a brownfield site. The site was originally quarried for limestone, locally referred to as ragstone, from the Hythe Beds of the Lower Greensand in the period between 1897 and 1958, and then infilled at various times. In recent years prior to the 1970s, Kent County Council (KCC) and then Maidstone Borough Council (MBC) infilled the quarry workings of the southern part of the site together with the adjoining land at Walnut Tree Farm with general and domestic waste. The northern part of the site was used for the disposal of paper and factory waste from the (then) neighbouring paper mills. The tipping of waste was completed around 40 years ago (1970s).

2.2.2 The domestic refuse collected and deposited by the local councils at the southern part of the site was excavated and screened for removal in 2010/11. The soils layer capping/covering the waste was scraped off and set aside and remain on site. In order to aid development of the site these soils and ragstone material present in the landfill, which was used for intermediate cover during the infilling operation have been screened to remove larger elements of waste and the resultant materials left in the stockpiles are mostly soils and stones with some small fragments of plastic and glass.

2.2.3 The site has been extensively remodelled over the years and the current state is that there are now stockpiles of inert materials described above (screened materials and non-processed excavated soils) which are proposed to be used as fill materials for the excavated valleys on the site which need to be reprofiled and recontoured for future development. No further treatment of materials is required for the proposed development.

2.2.4 The history of the site throughout the years can be seen in table 2.4 below.

Table 2-3: Site History

Date	Use
1884	Agricultural land.
1897 – 1958	Quarrying for building stone.
1950 – 1976 (approximately)	Backfilling with refuse including ash, domestic refuse and paper pulp.
1980 – late 1990s	Fuel depot on the north western corner.
1992	Tipped soils re-excavated and recycled.
2000	Extensive remodelling, re-excavation and recycling.
2002	Low area on northern eastern side was infilled with quarry waste hassock.
2010- 2014	Overspill of domestic refuse excavated and screened to remove unsuitable deposits in the southern part of the site.
2017-2018	Installation of gas barrier between subject site and adjacent KCC site.

2.2.5 The site is recorded as a historical inert landfill site/ refuse tip.

2.3 Proposed Development

2.3.1 The site is bound to the north by Farleigh Hill, to the east by residential development, to the south by disused industrial land and to the south west by an historic landfill (KCC owned) that is currently occupied by fields used for grazing horses.

2.3.2 The site has planning permission for the development and construction of 272 No. house and associated infrastructure. Plans and layout of the proposed development can be found in **Appendix B**. Planning permission requires the development to be started by May 2021.

2.3.3 In order to progress the development, reprofiling and recontouring of the excavated workings is required. In total, approximately 66,294 m^3 of material will be required to reprofile and recontour the site in order to achieve the desired development platforms. The materials to be used are those from the screening of the deposited waste and quarry waste from the historic quarrying activities carried out at the site (predominantly the latter). These materials are already on site. There is an overall deficit of material on site, therefore, non-waste material will be imported to meet the deficit of 9,572 m^3.

2.3.4 Over a number of years, discussions have taken place with KCC, MBC and the EA regarding the proposals for developing the site and the re-use of the waste in the development. These discussions have concluded that the use of the waste materials will require a bespoke waste recovery permit to undertake the work.

2.4 Planning Permission

2.4.1 Planning permission has been granted for the erection of 272 No. dwellings by MBC (references MA/01/0686, MA/10/0256[4] and 15/509041/REM[5]).

2.4.2 The planning permission allows for the redevelopment of land at Farleigh Hill with a housing scheme to provide some 272 No. dwellings with associated access, parking and garaging. The scheme will secure the remediation of the site, provide a suitable substrate for the construction of new houses with gardens, allows for the regrading of the land to marry the nearby development.

2.4.3 13.3% of the new units will be affordable housing contributing towards the Maidstone Borough Council local development plan to include affordable housing and is a key component of the regeneration of the urban area of Tovil.

2.4.4 The National Planning Policy Framework (NPPF)[6] details the requirements on local planning policies to promote the effective use of land in meeting the need for homes and other uses, in a way that makes as much use as possible of previously developed or 'brownfield' land. The use of the site in development of housing will meet the requirements of the NPPF for a sustainable development in delivering economic, social and environmental benefits to the local area, in that it will make effective use of brownfield land, provide affordable housing and benefit the surrounding area through restoration of the disused landfill and quarry site.

2.5 Site Remediation

2.5.1 Following EA approval of a Reclamation Method Statement prepared by Liverpool Environmental Consultants Ltd (2006), P J Burke (Kent) Ltd screened the material on site in accordance with the recommendations in that report. A copy of the reclamation method statement can be found in **Appendix F**.

2.5.2 As part of the waste screening, recyclable and non-inert wastes were removed from site for disposal or recovery. Inert wastes were stockpiled for future use in recontouring and reprofiling the site for future development. In total, 499 No. loads totalling 9,564.73 tonnes were removed to the Cory Greatness facility and Sevenoaks, 121 No. loads totalling 3,102.6 tonnes to the Waste Recycling Group landfill at Milton and a further 711 tonnes removed by skip. The materials removed mainly consisted of biodegradable and recyclable (glass and plastic) wastes.

[4] https://pa.midkent.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=Q861JNTYHRV00

[5] https://pa.midkent.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=NX8KQHTY0YG00

[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810507/NPPF_Feb_2019_print_revised.pdf

2.5.3 On the western boundary a near vertical face existed adjacent to the adjoining land. This was approximately 19 m high at its maximum and a 1 m to 19 m height of landfill waste was exposed along the boundary. During 2017, P J Burke Properties Limited installed a landfill gas barrier along the length of this boundary under a CQA plan, consisting of an engineered earth bund placed against the KCC landfill waste with a continuous gas membrane installed by Butek along the length of the bund and anchored into natural ground (Atherfield Clay) in the lowest portion and Hythe beds elsewhere along its length. It is anchored at the top into the upper surface of the earth bund. A rubble filled venting trench was installed to depths of up to 6 m to the KCC landfill side of the gas membrane.

2.5.4 The levels across the site vary considerably, however the site generally slopes down from the south and west towards the north and east.

2.5.5 A summary of cut/fill balances of materials at the site has been produced to inform the waste recovery permit application. This is detailed in Table 2-4 below and can also be found in the cut and fill analysis plan included in **Appendix A.**

Table 2-4: Cut/Fill Balance

Stockpile / Area	Cut (m^3)	Fill (m^3)	Net (m^3)
Pile 1	1,699.65	-	1,699.65
Pile 2	610.02	-	610.02
Pile 3	131.92	-	131.92
Pile 4	2,834.91	-	2,834.91
Pile 5	795.20	-	795.20
Pile 6	3,719.33	-	3,719.33
Total Stockpiles	**9,791.03**	**-**	**9,791.03**
Area A	7,120.20	5,272.06	1,848.14
Area B	5,753.92	11,930.07	-6,176.15
Area C	2,044.87	11,374.59	-9,329.72
Area D	1,742.45	1,413.49	328.96
Area E	30,268.52	182.89	30,085.63
Area F	1.00	36,120.53	-36,119.53
Total Areas	**46,930.96**	**66,293.63**	**-19,362.67**
Total Areas & Stockpiles	**56,721.99**	**66,293.63**	**-9,571.64**

2.5.6 As shown above in Table 2-4, overall, there is a deficit of approximately 9,572 m^3 of material on site to that required to prepare the site to the required development formation platform. Non-waste material will be imported to meet this deficit as detailed in sections 3.4 and 4.3 below. There may be additional minor shortfalls due to re-compaction of excavated uncompacted material (as per notes on Phasing schematics in **Appendix C**), as well as potential minor additional volumes required to replace any unsuitable materials taken off site.

3 DEMONSTRATION OF RECOVERY

3.1 Overview

3.1.1 In order to aid the proposed development of the site, the identified inert waste materials need to be moved around site using cut and fill techniques in order to meet the platform levels required by planning for the development of the site. It is planned to use the waste materials already present on site where possible as fill materials towards meeting the required fill volumes.

3.1.2 Overall, there is a deficit of materials on site to meet the final development formation platform therefore additional materials will be imported to meet the deficit. The imported materials will be non-waste and not subject to the waste recovery requirements.

3.1.3 Regards the recovery of deposited material at the site, pre-application discussions with the Environment Agency have taken place over several years. On each occasion the discussions have concluded that the process of excavating the landfilled material, screening all recyclable and biodegradable for offsite disposal and recovery with the inert waste then stockpiled and reused for reprofiling and recontouring the site prior to the development should be done under a bespoke waste recovery permit.

3.2 Purpose of the Work

3.2.1 The site has been identified as a key housing area for the Maidstone area and planning permission has been granted by MBC for development of the site for 272 dwellings.

3.2.2 Remediation of the site is required to allow re-development under a planning permission for residential and associated infrastructure. Such re-development cannot be undertaken without remediation, re-profiling and recontouring of the site. In order to achieve this, material needs to be placed in order to achieve the desired levels for the development of the site.

3.2.3 The site has been extensively remodelled over the years and the current state is that there are now stockpiles of inert materials described above (screened materials and non-processed excavated soils) and areas of the site which will be cut and which are proposed to be used as fill materials for the excavations on the site which need to be reprofiled and recontoured for future development.

3.2.4 It has been identified that some of the waste materials on site (mainly site derived quarry waste in Area E), will require further processing and treatment comprising crushing of over-sized ragstone in order to prepare for use as fill material. It is proposed that this activity is carried out as part of the environmental permit along with the waste recovery activity. The environmental permit application which will be submitted following the submission of the waste recovery plan will include details on this activity.

3.2.5 The works will be carried out in phases to allow for the materials to be moved around the site from areas of cut to areas of fill and allowing for treatment (screening and crushing) of oversized materials where required. Plans showing details of the phases and the materials movements for each phase can be found in **Appendix C**.

3.2.6 Inert materials which have been recovered from the historic screening of excavated landfill materials and from excavated soils which were previously used at the site as cover materials and dust control are to be to be used for the reprofiling and recontouring of the site. These principally comprise naturally occurring materials from the site comprising ragstone (gravel and cobble of limestone and sandstone) and hassock (silt and fine sands) deposits derived from former workings of the Hythe Beds and soils.

3.2.7 Planning permission requires the site to be ready for development by May 2021, therefore, the operator is obliged to restore the site to those levels detailed by this date in order that the site be developed for housing as proposed.

3.2.8 Development of the site will allow for a more appropriate graded site profile that will allow for the stabilisation of a steep slope between the site and the adjoining development. Stabilisation works will be carried out with non-waste materials. The recontouring will allow residential development that would lessen the visual dominance in relation to existing houses surrounding the site and resolve any potential problems associated with steep slopes on the boundary. The ability of the scheme to improve the amenity and safety of existing residents is a benefit for the locality and the environment.

3.3 Use of Waste Material

3.3.1 The site has been the subject of several phases of intrusive site investigations, with associated laboratory testing of representative samples dating back to 2004, with the most recent investigation occurring in December 2019. The waste material to be used in the proposed scheme has undergone sampling and analysis to confirm that it is suitable for use and is confirmed to be inert and non-hazardous. Further details of monitoring and analysis undertaken can be found in **Appendix H**. A summary of the analysis results and waste characterisation in included in Section 5 below.

3.3.2 All biodegradable wastes have been removed as part of the historic screening works as far as possible. Any recyclable materials remaining within the stockpiles will be removed as part of the screening and waste acceptance procedures. Waste acceptance procedures have been developed for the site and are to be included in the environmental permit application.

3.3.3 Quarry waste materials (ragstone and hassock deposits) have previously been used at the site to construct a gas barrier between the adjacent capped KCC landfill and the site. This has been agreed with KCC and the EA thus demonstrating suitability of material for chemical and physical properties for future use as fill material.

3.3.4 The screening of excavated materials has resulted in the recovery of site won ragstone and hassock deposits cover materials which had previously been used to control dust and prevent spreading of refuse etc by wind and the processing of quarry waste materials (ragstone and hassock deposits) which remain in stockpile and have also been found underlying all areas of the site. These are used as a marker horizon to indicate the base of subsequently placed landfilled deposits.

3.3.5 Part of the site is to be permitted for waste recovery and waste treatment operations (crushing and screening), however, specific sections will be utilised for each activity as shown in the boundary plan included as **Appendix A**. The stockpiled materials currently stored at site (as shown in **Appendix C**) will be screened and crushed if required prior to moving into the permitted area for deposit and re-profiling works. The phasing plans in **Appendix C** show materials movements around the site during each phase of the development works. The materials processing area will include an area for quarantining unsuitable waste materials identified during the phasing works.

3.4 Quantity and Type of Waste

3.4.1 As detailed above, the material to be used for reprofiling and recontouring is already present on site, with any deficit being met using imported hassock material. The material to be used is the inert wastes that have been excavated from the landfill and quarrying and then screened plus a balance of imported material. No additional waste material is to be sourced for the development and final profiles of the site will be achieved using on site earthworks construction materials (ragstone and hassock) and topsoil materials or road construction materials.

3.4.2 The site has been granted planning permission based on consideration of the surrounding land, the need for gradual gradients to produce gentle slopes for roads, paths and gardens, and to avoid large retaining structures within or at the perimeter, described in further detail as follows.

Terracing of the Site

3.4.3 To deal with the loss of amenable gradients through the site that material importation allows, the scheme designers would be forced to utilise terracing as a response to the unacceptable site gradients that would exist. This would be unavoidable as the proposed housing scheme is required to be connected to a new junction to the only available access point from the main road at the top of the site.

3.4.4 Terracing of the quarry would require the creation of engineering structures that would reduce the site's development footprint and thus reduce its potential for the provision of housing. Additionally, terracing of residential schemes is highly undesirable as it creates hazards to residents due to the forced creation of sudden changes in elevation (drops and/or very steep slopes) as well as severing the design connectivity of both people but also services (electric/gas/mains water/foul drainage) leading to unnecessary complication of design. Indeed, foul drainage that relies on positive slopes from properties to the connecting sewers and drains located at the north end of the site would be rendered inoperable due to the creation of reverse gradients within the site. This would require additional powered infrastructure to be adopted by the local sewer undertaker.

3.4.5 Such a situation is highly unfavourable and would not easily gain planning approval, if at all. This undesirable scenario has obviously not been tested with planners as no land developer is in the business of bringing knowingly and likely unviable schemes forward for planning consideration solely for the purposes of identifying minimum quantities of construction materials, that themselves, have far less bearing on the site's viability for residential development.

Loss of Aspect

3.4.6 If levels are not brought up to those proposed with the approved site scheme design, some properties at the southern end would be sited within the bowl of the former quarry and lack any natural amenity afforded by the site's topographic elevation, situated on the northern flanks of the North Downs. The land immediately surrounding the former quarry void enjoys far reaching views to the west and north across the River Medway valley and the Maidstone townscape. To develop the site without normalising levels as permitted by MBC would deny residents this important landscape aspect and not realise the site's potential for a sustainable and pleasant development.

3.4.7 Such is the importance of this element of the scheme amenity, it is considered a strategic imperative that the site be brought up to a suitable development level that a surplus of material over that present in the quarry footprint presently, has been needed. This demonstrates the driver for waste material use is not as a consequence of its availability at site. The same volume of any lawful use of material brought to the site would be required to realise the site's amenity / design potential and gain favourable support by MBC.

Sustainability

3.4.8 Given there is an imperative need for material at the site to manage levels, it is clearly preferable to utilise appropriate construction materials, that have been shown to be chemically and physically viable for such use, to bring the site to a satisfactory pre-construction platform as expected by prospective future purchasers of the site for the purposes of residential development. This is an environmentally advantageous outcome reducing the movement and working of materials generating a less carbon intensive construction programme.

3.4.9 Additionally, forcing a poor design and sub-optimal layout solely to limit a theoretical dependence on imported materials (which assumes the on-site materials would be landfilled as their re-use on any other site would be an outrageous double standard) would also drive the design to have dependence on pumped drainage solutions that are not sustainable compared to gravity systems resulting in perennial and completely avoidable energy usage and associate carbon emissions.

3.5 Conclusions

3.5.1 In conclusion, whilst planning permission is not in itself justification for waste recovery volumes, a key local issue supported within the MBC Local Plan is ensuring that all new development is built to a high standard of sustainable design and construction and in doing so create a welcoming built environment. This is also what a developer is seeking to purchase as an investment as it secures land value.

3.5.2 The granting of planning permission for these schemes is always the culmination of lengthy pre application consultation and design evolution. Whilst not undertaken directly for the purposes of minimising the use of construction materials (whether they be wastes or not) it has resulted in the best design solution requiring the volume of material described within the WRP. This volume is greater than that available from the site itself.

3.5.3 It is arguably an unhelpful distraction that waste materials are site derived as this suggests material is being used because it is there. This is simply not the case. If no waste materials resided on site, then the same volume of material would be required to be imported to site - again be they waste (under a different WRP) or not – to achieve the most viable, practical, safe, sustainable and valuable end use. The financial data provided proves this quite clearly.

3.5.4 In addition to the above considerations for planning, minimum quantities of waste are being used for the scheme in the fact that only waste currently present on site is being used. There is a deficit of material for the overall scheme requirements, however, it has been decided by the operator to source this material as non-waste hassock at an additional cost rather than sourcing waste material to import to the site to meet the deficit.

3.5.5 Details of the stockpiled wastes on site to be used in the recovery operation can be found in Table 3.1 below:

Table 3-1: Waste Stockpiles / Areas Descriptions

Area / Pile No	Cut Volume	Fill Volume	Material Description
Pile 1 Materials recovered prior to off-site removal of domestic waste	1,699.65 m^3	-	Predominantly a well graded mix of ragstone and hassock deposits previously used as cover materials during deposition of domestic refuse and won back by selective excavation and screening. With minor quantities of brick, glass, concrete and plastic. A proportion of the western boundary has been filled with quarry waste to form the ground gas barrier separating the subject site from the adjacent former landfill.
Pile 2 Materials recovered prior to off-site removal of domestic waste	610.02 m^3	-	
Pile 3 Materials recovered prior to off-site removal of domestic waste	131.92 m^3	-	
Pile 4	2,834.91 m^3	-	Predominantly a well graded mix of ragstone and hassock deposits previously used as cover materials during deposition of domestic refuse and won back by selective excavation and screening. With minor quantities of brick, glass, concrete and plastic. A proportion of the western boundary has been filled with quarry waste to form the ground gas barrier separating the subject site from the adjacent former landfill.
Pile 5	795.20 m^3	-	
Pile 6	3,719.33 m^3	-	
Area A (Former Fuel Depot and Site Entrance)	7,120.20 m^3	5,272.06 m^3	Mainly a mix of ash and clay to approximately 14m depth, with lesser quantities of quarry waste (ragstone and hassock deposits derived from Hythe Beds strata) and builder waste (mainly brick) Ash derived from paper manufacturing processes.
Area B (Area where domestic waste was tipped in 1970s – since remediated by PJ Burke by excavation and off-site disposal)	5,753.92 m^3	11,930.07 m^3	Currently there is a layer of between 0.00m and 2.70m of predominantly sand and gravel derived from Hythe Beds strata mixed with lesser quantities of bricks, locally ash, concrete, metal, plastic and glass. Below this, typically at 1.0 mbgl is underlain by quarry waste materials derived from Hythe beds. (NOTE: Previously up to 6m depth of domestic waste and shredded paper waste overlying 0m-5m of sandy clay and gravelly sand, underlain at

			depth by quarry waste (ragstone and hassock deposits derived from Hythe Beds strata).
Area C	2,044.87 m^3	11,374.59m^3	Predominantly quarry waste materials. Within the upper 3m this is mixed with small gravel sized inclusions of brick, glass and plastic. A proportion of the western boundary has been filled with quarry waste to form the ground gas barrier separating the subject site from the adjacent former landfill.
Area D	1,742.45 m^3	1,413.49 m^3	Sandy gravelly clay with inclusions of brick and ash underlain by quarry wastes
Area E	30,268.52m^3	182.89 m^3	Sandy gravelly clay underlain by quarry waste material
Area F	1.00 m^3	36,120.53m^3	Predominantly quarry waste materials. Within the upper 3m this is mixed with small gravel sized inclusions of brick, glass and plastic.
Total Volume	**56,721.99 m^3**	**66,293.63 m^3**	**Deficit of material = 9,571.64 m^3**
Total Tonnage	**102,099.582 tonnes**	**119,328.534 tonnes**	**Deficit of material = 17,228.95 tonnes**

*based on 1.8 tonnes/m3

3.5.6 The above table represents the following stockpiles at the site:

- 1A-1D Recovered cover soils (ragstone and hassock deposits predominantly) - remediated landfill waste (4No.)
- 2A-2B Recovered cover soils (ragstone and hassock deposits predominantly) - remediated landfill waste (2No.)
- 3A-3D Recovered cover soils (ragstone and hassock deposits predominantly) - remediated landfill waste (4No.)
- 4A-4B Recovered cover soils (ragstone and hassock deposits predominantly) - remediated landfill waste (2No.)
- 5 Recovered cover soils (ragstone and hassock deposits predominantly) - remediated landfill waste (1 No.)
- 6A-6B Recovered cover soils (ragstone and hassock deposits predominantly) - remediated landfill waste (2No.)

3.5.7 Area A is identified as including ash materials which are not suitable for use as infill as detailed in the earthworks specification. The borehole logs from the site investigation carried out by Southern Testing in 2004 have been reviewed and identified that the main concentrations of ash have been identified in the northern section of Area A which in turn is identified as an area of fill rather than cut. The boreholes in this area are boreholes 5, 13 and 14. The boreholes in the area identified as cut material for use an in-fill are boreholes 9 and 11 which show that the majority of this material is clay and quarry waste and therefore suitable for use as infill. It should be noted that the landfilled material (glass, plastic and metal etc.) identified in the borehole logs for boreholes 9 and 11 has been removed and screened as part of the works identified above. **Appendix K** includes borehole logs and a location plan to confirm that cut materials from Area A are not expected to include ash or asbestos materials. Based on this, the volumes included for the cut material in Area A does not include ash material, only quarry waste material suitable for use in the waste recovery activity.

3.5.8 Waste acceptance procedures identify that should any ash or asbestos materials be identified in cut materials from area A, it will be removed to the quarantine area for removal from site and therefore not used as fill materials in the waste recovery activity. Any deficit of material will be met with non-waste material sourced from off site.

3.5.9 Plans identifying the areas of the landfill referenced in Table 3.1 above can be found in the site plans included in Figures 3.1 and 3.2 below and also in **Appendix A.**

3.5.10 Table 3.1 identifies a deficit in material on site of approximately 9,572 m^3. The material to meet this deficit will be sourced from off-site as a non-waste hassock product. There may be additional shortfall due to what should be relatively minor overall net shrinkage following excavation and re-compaction (as per notes on Phasing schematics in **Appendix C**), also to replace any unsuitable materials taken off site.

Figure 3.1: Waste Areas Plan

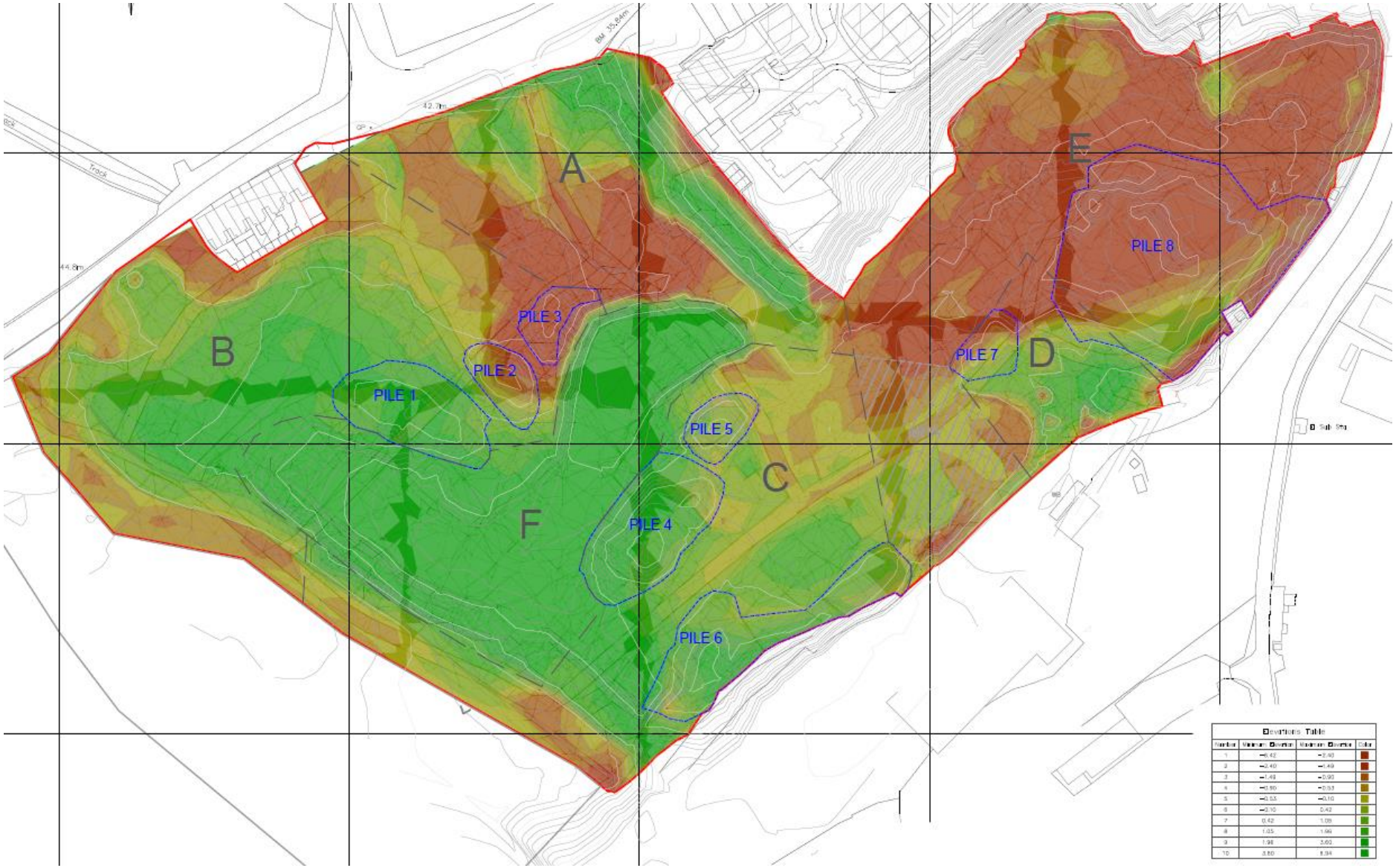


Figure 3.2: Proposed Permit Boundary (Purple Line)

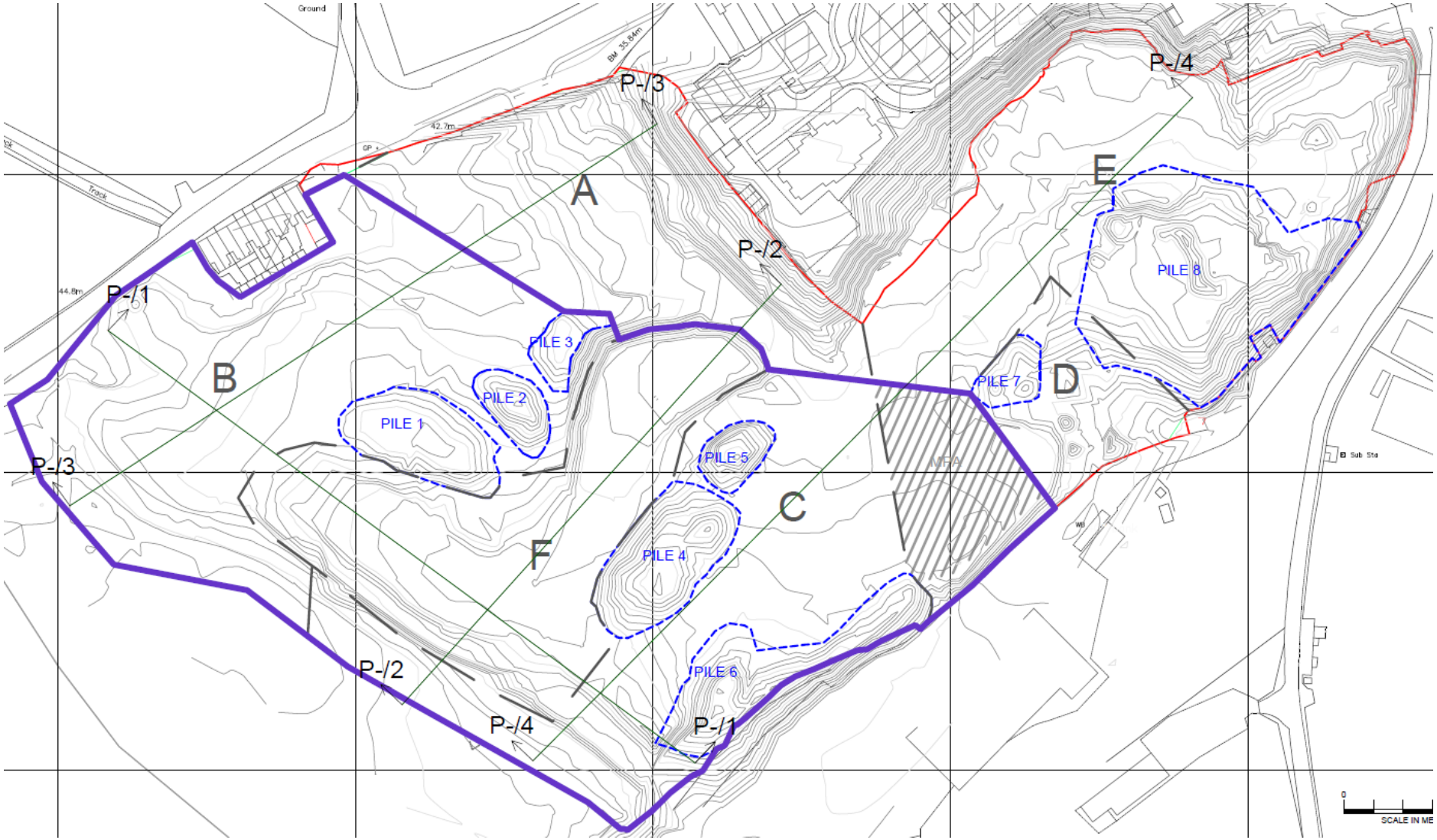
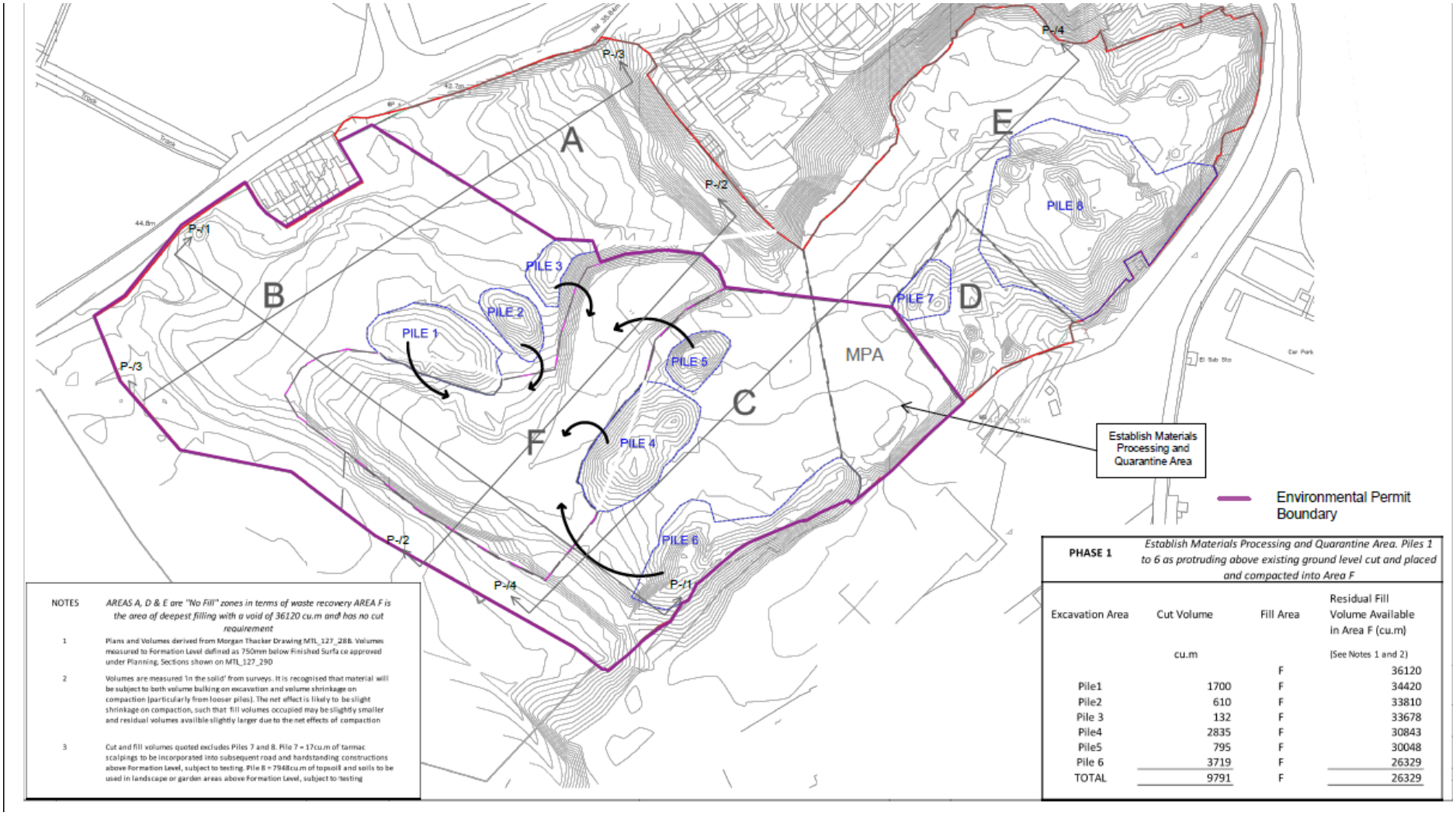


Figure 3.3: Proposed Material Movements – Phase 1



NOTES

AREAS A, D & E are "No Fill" zones in terms of waste recovery AREA F is the area of deepest filling with a void of 36120 cu.m and has no cut requirement

1 Plans and Volumes derived from Morgan Thacker Drawing MTL_127_288. Volumes measured to Formation Level defined as 750mm below Finished Surfa ce approved under Planning. Sections shown on MTL_127_290

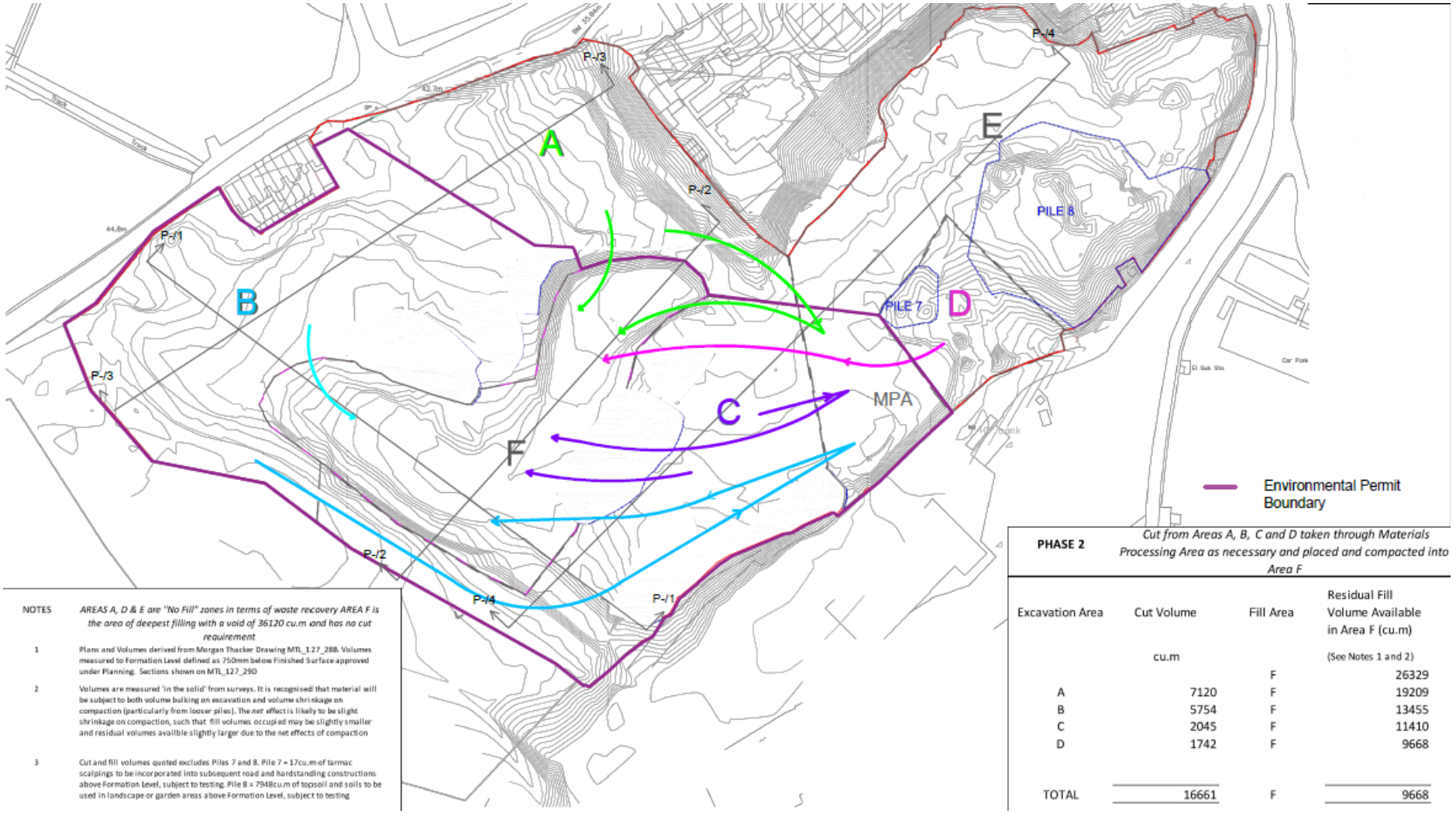
2 Volumes are measured 'in the solid' from surveys. It is recognised that material will be subject to both volume bulking on excavation and volume shrinkage on compaction (particularly from looser piles). The net effect is likely to be slight shrinkage on compaction, such that fill volumes occupied may be slightly smaller and residual volumes availble slightly larger due to the net effects of compaction

3 Cut and fill volumes quoted excludes Piles 7 and 8. Pile 7 = 17cu.m of tarmac scalpings to be incorporated into subsequent road and hardstanding constructions above Formation Level, subject to testing. Pile 8 = 7948cu.m of topsoil and soils to be used in landscape or garden areas above Formation Level, subject to testing

PHASE 1 *Establish Materials Processing and Quarantine Area. Piles 1 to 6 as protruding above existing ground level cut and placed and compacted into Area F*

Excavation Area	Cut Volume	Fill Area	Residual Fill Volume Available in Area F (cu.m)
	cu.m		(See Notes 1 and 2)
		F	36120
Pile1	1700	F	34420
Pile2	610	F	33810
Pile 3	132	F	33678
Pile4	2835	F	30843
Pile5	795	F	30048
Pile 6	3719	F	26329
TOTAL	9791	F	26329

Figure 3.4: Proposed Material Movements – Phase 2



NOTES

AREAS A, D & E are "No Fill" zones in terms of waste recovery AREA F is the area of deepest filling with a void of 36120 cu.m and has no cut requirement

1 Plans and Volumes derived from Morgan Thacker Drawing MTL_127_288. Volumes measured to Formation Level defined as 750mm below Finished Surface approved under Planning. Sections shown on MTL_127_290

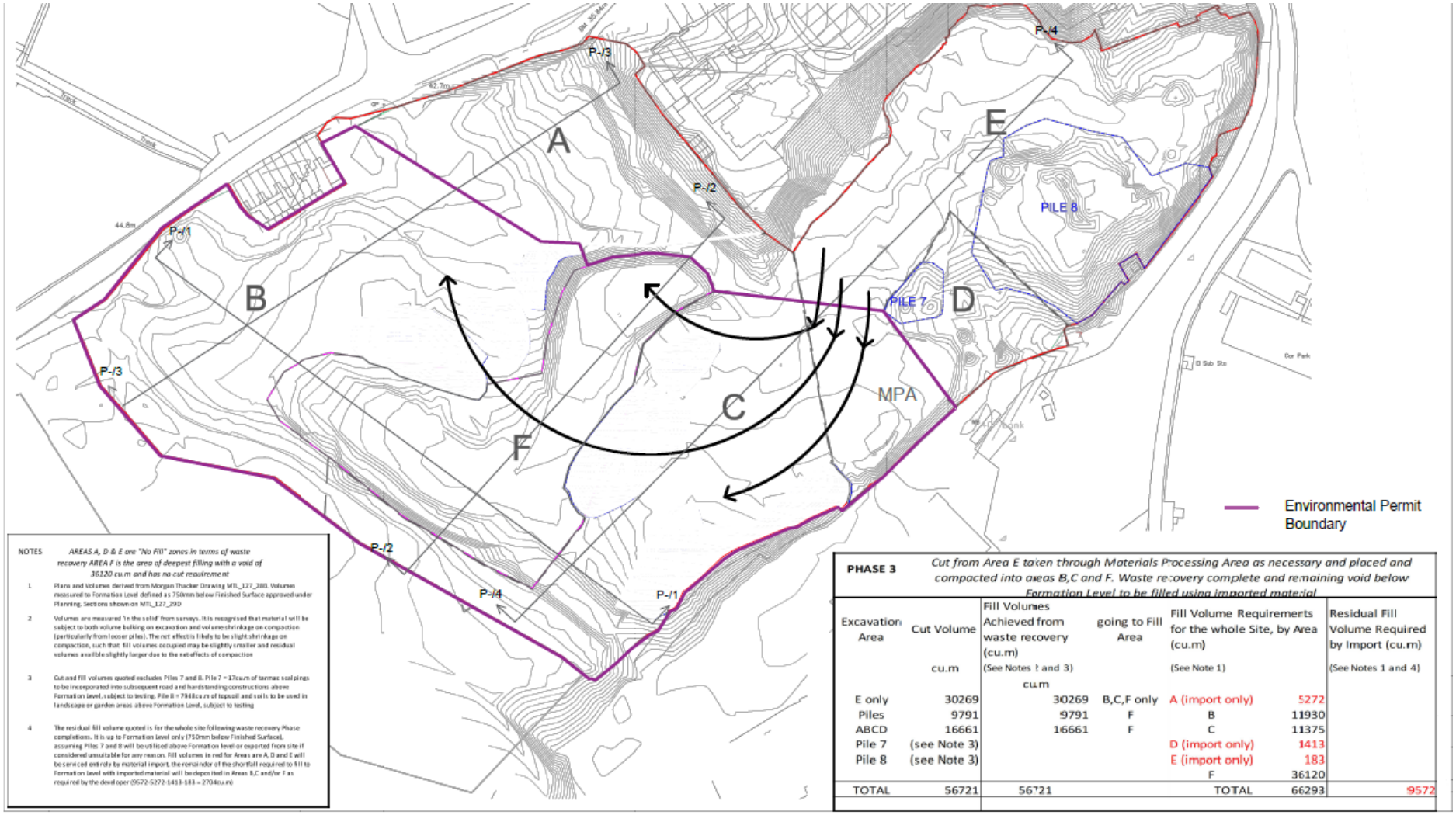
2 Volumes are measured 'in the solid' from surveys. It is recognised that material will be subject to both volume bulking on excavation and volume shrinkage on compaction (particularly from looser piles). The net effect is likely to be slight shrinkage on compaction, such that fill volumes occupied may be slightly smaller and residual volumes availble slightly larger due to the net effects of compaction

3 Cut and fill volumes quoted excludes Piles 7 and 8. Pile 7 = 17cu.m of tarmac scalpings to be incorporated into subsequent road and hardstanding constructions above Formation Level, subject to testing. Pile 8 = 7948cu.m of topsoil and soils to be used in landscape or garden areas above Formation Level, subject to testing

PHASE 2 *Cut from Areas A, B, C and D taken through Materials Processing Area as necessary and placed and compacted into Area F*

Excavation Area	Cut Volume	Fill Area	Residual Fill Volume Available in Area F (cu.m)
	cu.m		(See Notes 1 and 2)
		F	26329
A	7120	F	19209
B	5754	F	13455
C	2045	F	11410
D	1742	F	9668
TOTAL	16661	F	9668

Figure 3.5: Proposed Material Movements – Phase 3



NOTES

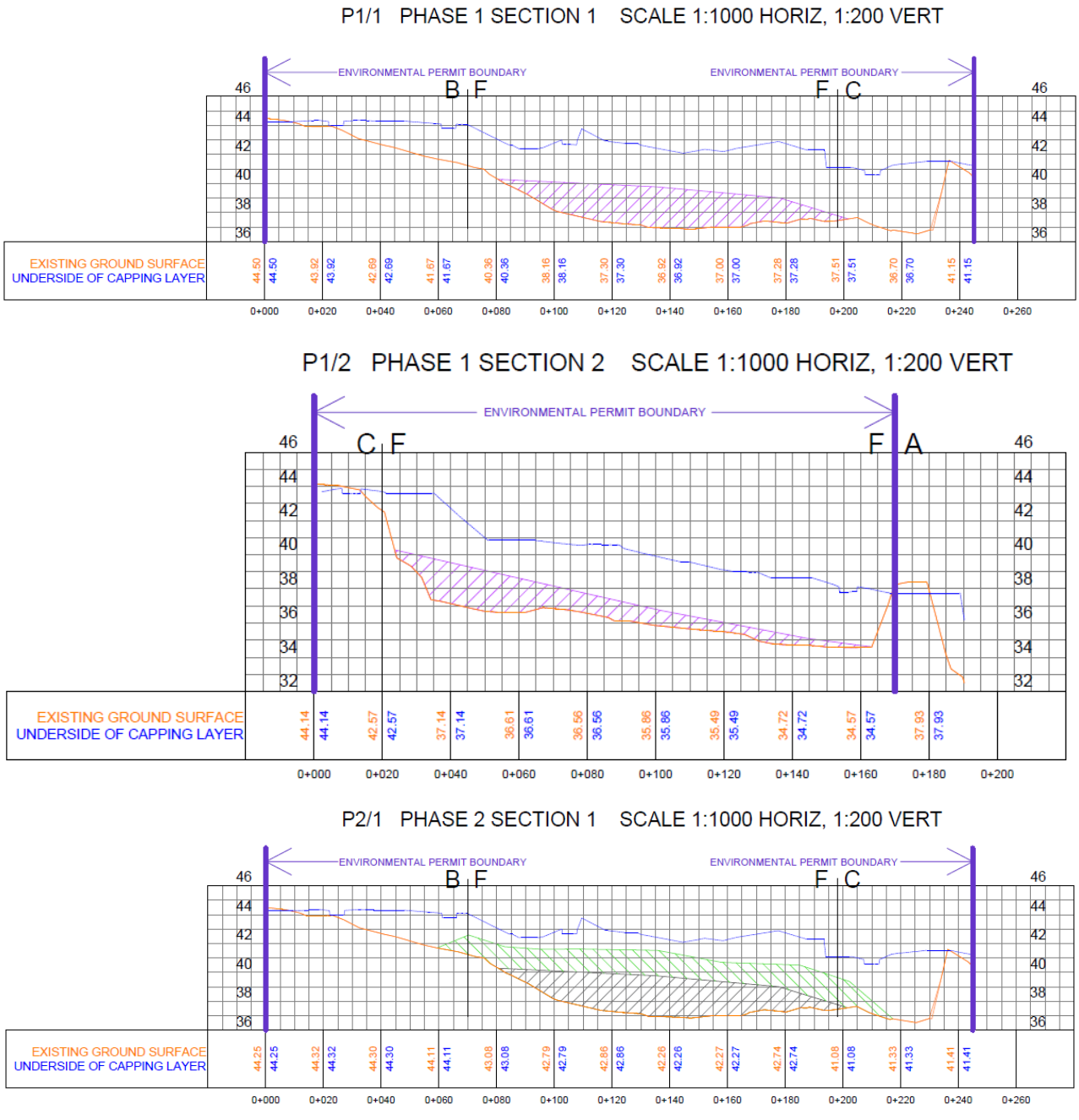
AREAS A, D & E are "No Fill" zones in terms of waste recovery AREA F is the area of deepest filling with a void of 36120 cu.m and has no cut requirement

1. Plans and Volumes derived from Morgan Thacker Drawing MTL_127_280. Volumes measured to Formation Level defined as 750mm below Finished Surface approved under Planning. Sections shown on MTL_127_290
2. Volumes are measured 'in the solid' from surveys. It is recognised that material will be subject to both volume bulking on excavation and volume shrinkage on compaction (particularly from loose piles). The net effect is likely to be slight shrinkage on compaction, such that fill volumes occupied may be slightly smaller and residual volumes available slightly larger due to the net effects of compaction
3. Cut and fill volumes quoted excludes Piles 7 and 8. Pile 7 = 17cum of tarmac scalpings to be incorporated into subsequent road and hardstanding constructions above Formation Level, subject to testing. Pile 8 = 7944cu.m of topsoil and soils to be used in landscape or garden areas above Formation Level, subject to testing
4. The residual fill volume quoted is for the whole site following waste recovery Phase completions. It is up to Formation Level only (750mm below Finished Surface), assuming Piles 7 and 8 will be utilised above Formation level or exported from site if considered unsuitable for any reason. Fill volumes in red for Areas are A, D and E will be serviced entirely by material import, the remainder of the shortfall required to fill to Formation Level with imported material will be deposited in Areas B,C and/or F as required by the developer (9572-5272-1413-183 = 2704cu.m)

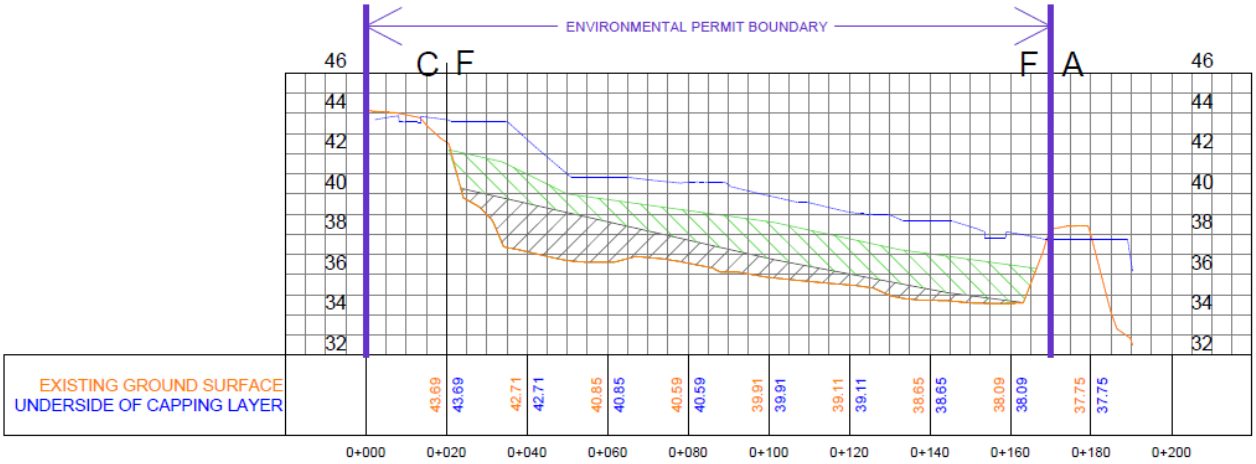
PHASE 3 *Cut from Area E taken through Materials Processing Area as necessary and placed and compacted into areas B,C and F. Waste recovery complete and remaining void below Formation Level to be filled using imported material*

Excavation Area	Cut Volume cu.m	Fill Volumes Achieved from waste recovery (cu.m) (See Notes 1 and 3) cu.m	going to Fill Area	Fill Volume Requirements for the whole Site, by Area (cu.m) (See Note 1)		Residual Fill Volume Required by Import (cu.m) (See Notes 1 and 4)
E only	30269	30269	B,C,F only	A (import only)	5272	
Piles	9791	9791	F	B	11930	
ABCD	16661	16661	F	C	11375	
Pile 7	(see Note 3)			D (import only)	1413	
Pile 8	(see Note 3)			E (import only)	183	
				F	36120	
TOTAL	56721	56721		TOTAL	66293	9572

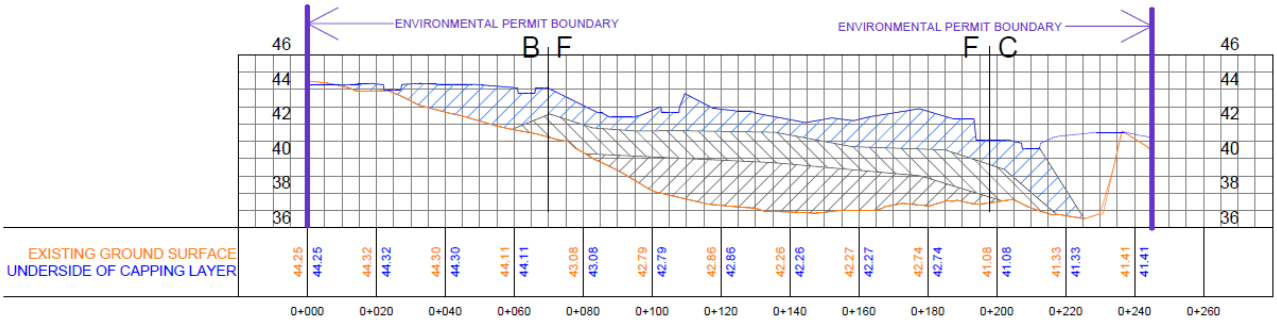
Figure 3.6: Cross Sections of Waste Fill Areas



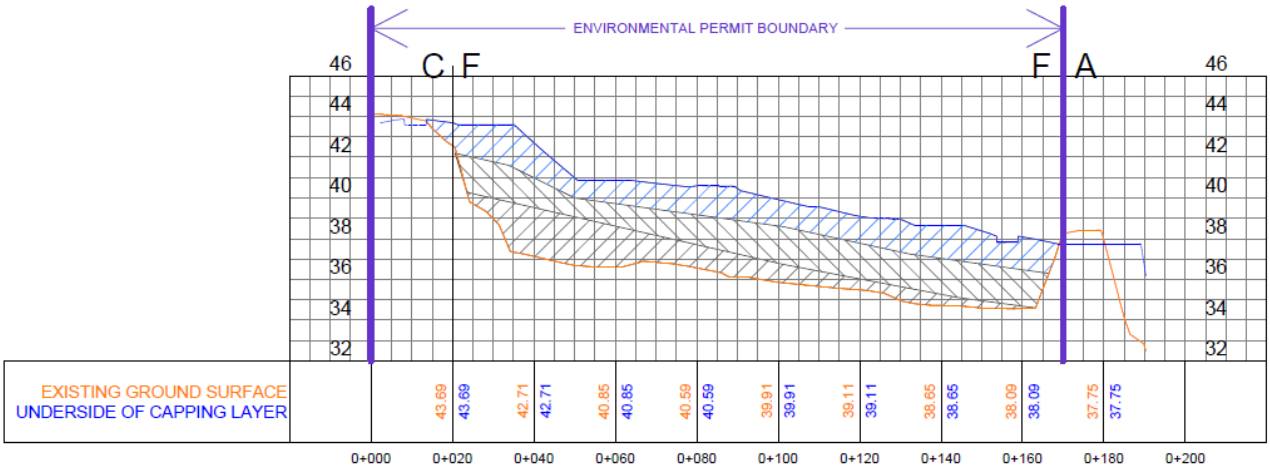
P2/2 PHASE 2 SECTION 2 SCALE 1:1000 HORIZ, 1:200 VERT



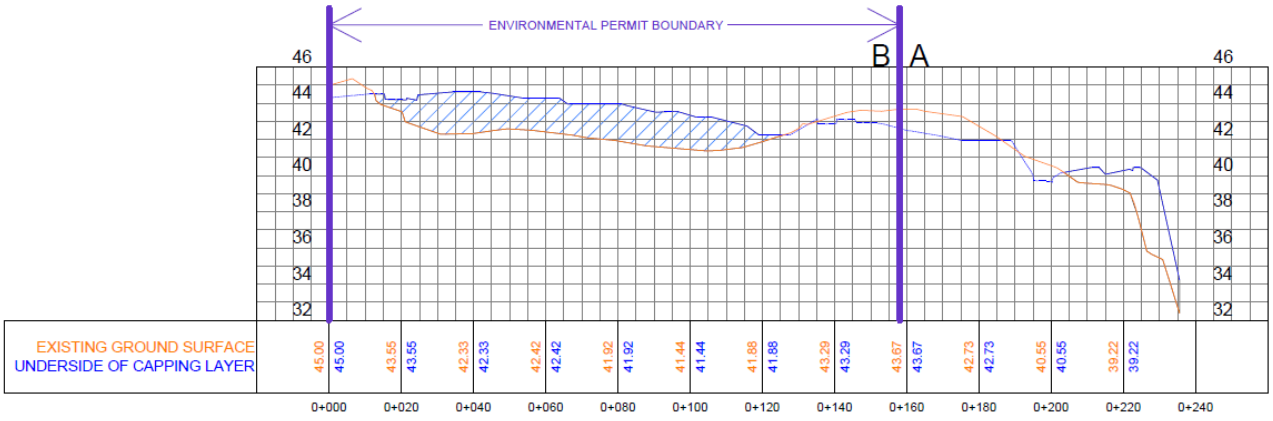
P3/1 PHASE 3 SECTION 1 SCALE 1:1000 HORIZ, 1:200 VERT



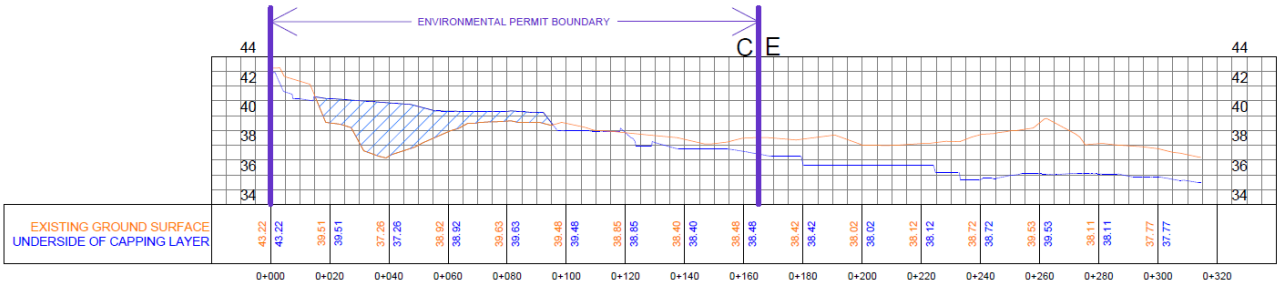
P3/2 PHASE 3 SECTION 2 SCALE 1:1000 HORIZ, 1:200 VERT



P3/3 PHASE 3 SECTION 3 SCALE 1:1000 HORIZ, 1:200 VERT



P3/4 PHASE 3 SECTION 4 SCALE 1:1000 HORIZ, 1:200 VERT



LEGEND

- FILL WITH PILES 1 TO 6
- FILL WITH CUT MATERIAL FROM AREAS A, B, C, D
- FILL WITH CUT MATERIAL FROM AREA E
- EXISTING GROUND SURFACE
- FINISHED FORMATION SURFACE
- ENVIRONMENTAL PERMIT BOUNDARY

3.5.11 Full versions of the plans/figures included above can be found in the appendices.

3.5.12 The European Waste Catalogue (EWC) codes for the waste stockpiles can be found in Table 3.2 below:

Table 3-2: Waste Types

EWC Code	Description	Area / Pile No
17 05 04	soil and stones other than those mentioned in 17 05 03	Areas A, B & C, Area E materials that do not require further processing
19 12 09	Minerals (for example sand, stones) only. Restricted to wastes from treatment of waste aggregates that are otherwise naturally occurring minerals. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.	Area E
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11	Stockpiles 1 to 6

3.5.13 The void would first be filled with processed soils from the screen (the waste) on code 19 12 12, and then a layer of soil and stones, code 17 05 04. This would prepare the site to a development platform for the site developer to place the necessary levels of construction materials subsoil and topsoil needed for the residential area and would be able to carry out foundations and groundworks without excavating the soils, and wastes deposited as part of the recovery activities.

3.6 Design and Construction

3.6.1 Details of a proposed engineering methodology for the excavation and re-placement of site won soils to re-profile the site to the proposed landform are available in the Earthworks Specification (Knapp Hicks & Partners, 2017) which is included as **Appendix D**. All works will be undertaken using earthworks management plan and a material tracking database for the use of materials.

3.6.2 As the project has evolved since the original earthworks specification and remediation plans were developed, not all sections remain correct and relevant. These documents shall be taken as the basis for the design and construction of the works and shall be developed further with the groundworks contractor undertaking the work. The relevant sections of the Earthworks Specification are detailed below.

3.6.3 The engineering of the new profile will follow good practice earthworks procedures and relevant CQA reporting requirements with regards to compaction and testing protocols. Surface water management will be undertaken to minimise any potential risks from surface water run-off.

3.6.4 Testing has indicated that the waste materials to be used in the waste recovery activity are suitably uncontaminated and that their geotechnical properties are acceptable for use as engineering fill to reprofile the site. Further information on chemical and physical properties can be found in section 5 below. Details of trial pits and monitoring information can be found in **Appendix H**. Based upon testing and characterisation, Stockpiles 7 and 8 will not be used in the waste recovery activity and are not included in the overall cut and fill calculations for the site.

3.6.5 Materials will be placed in accordance with the specification detailed below. Only materials which comply with this specification will be used. Such materials will be principally granular or cohesive in character and free from contamination, organic debris or other material which may be subject to degradation.

3.6.6 Physical and compaction requirements for any imported materials will be specified by the site engineer. During operations the contractor will keep all earthworks protected and free of water by pumping out any areas of ponded water and by covering excavations where possible.

3.6.7 Compaction of materials will be by means of a vibrating roller and will be in accordance with Table 6/4 of the Department of Transport specification for Highway Works (1991). Method compaction shall be undertaken using plant and methods appropriate to the requirements for the class of material being compacted.

3.6.8 Earth moving plant will not be accepted as compaction equipment nor shall the use of a lighter category of plant to provide any preliminary compaction to assist the use of heavier plant be taken into account when assessing the amount of compaction required for any layer.

3.6.9 If more than one class of material is being used in such a way that it is not practicable to define the areas in which each class occurs, the contractor will compact with plant operating as if only the material which requires the amount of compaction required for any layer.

3.6.10 Following completion of the bulk filling to the required levels, a nominal thickness of 750mm of construction materials subsoil and topsoil will be added to meet required final levels for the housing development. This will be undertaken by the site developer following purchase of the site and will not be part of the waste recovery activities.

4 FINANCIAL GAIN BY USING NON-WASTE MATERIALS

4.1 Overview

4.1.1 It is proposed to undertake the restoration of the site under a bespoke waste recovery permit to allow reuse of certain recovered inert wastes to re-instate the site. This section will demonstrate that the client would benefit from a net financial gain if the site were to be restored using non-waste materials.

4.1.2 The use of waste materials to restore the site is not undertaken for financial incentives, it is to be used due to the availability of the materials on site and thus minimising the impacts of importing virgin materials/non-waste. It has been identified that there is a deficit of approximately 9,572 m^3 of materials on site to complete the restoration, therefore, non-waste materials will be imported to meet this deficit of materials and complete the restoration. There may be additional shortfall due what should be relatively minor overall net shrinkage following excavation and re-compaction (as per notes on Phasing schematics in **Appendix C**), also to replace any unsuitable materials taken off site.

4.1.3 Should the waste materials not be available, the restoration of the site would still be a viable option using non-waste/virgin materials due to the increased sale value of the land as a site with planning permission and development potential.

4.2 Expected Income and any Capital Gain

4.2.1 The current market value has been assessed by an independent chartered surveyor and estate agent. A copy of this assessment is included in **Appendix I**. This assessment has confirmed that the value of the site prior to any further works (cut and fill exercise) being undertaken is in the range of £10 – £12 million.

4.2.2 Once the enabling works (cut and fill exercise) have been undertaken, the market value of the site will be £15.75M. There will be no difference in the value from the use of waste versus non-waste. A copy of a potential sale agreement for the site is included in **Appendix I** as evidence of the final land sale value once the development works detailed above are completed**. Please note this information is commercially sensitive and should not be included in any public register.**

4.2.3 As detailed above, the capital gain will range from £3.75 - £5.75 million if enabling works are completed and the agreed sale goes to completion. As part of the condition of sale, there is a requirement on the site owner to undertake the cut/fill exercise. It is understood that a residential developer would be unlikely to purchase the site in its current condition without adding a margin and a contingency for risk to the expected cost of the exercise. With this in mind, the current and future values of the site are reflective of the site owner undertaking the cut/fill exercise rather than this being undertaken by the residential developer, as is the expected commercial arrangement for such sites.

4.3 Costs of Generating this Income and any Capital Gain

Non-waste Requirements

4.3.1 The volume of non-waste material required is equal to the total volume required to re-instate the site to the new construction formation levels. This equates to 66,293.63 m^3. Details on how this volume has been calculated are shown below and also in the Cut and Fill Analysis Plan enclosed in **Appendix C** and also in Table 3-1.

4.3.2 The fill requirements were calculated by Morgan Thacker Limited and Ian Thompson (Socotec UK) using topographic surveys, planning permissions levels and Autodesk Civil 3D computational software using the following drawings as reference:

- J.C.White drawing 17/00/093-02 titled 'Orthographic Aerial Image & Level Survey', dated April 2019 was used to define the existing ground level surface profile.
- BHD Architects drawing 2989-PD001-Rev E titled 'Site Plan' dated October 2015 was to define the proposed ground surface profile.

4.3.3 Appropriate non-waste materials will be primary quarried aggregate, sourced from local quarries.

Availability and Cost of Non-waste Materials

4.3.4 Non-waste materials will be sourced locally and will comprise hassock materials which are of the same nature and geological origin of the quarry waste materials that already exist on site. This material when imported will require no additional treatment for use but will be subject to routine earthworks compliance testing.

4.3.5 These materials can be sourced from the nearby Hermitage Quarry[7] and Blaise Quarry[8] both in Maidstone, with import costs as follows:

- Hassock materials = £4 / tonne (£7.20/m^3) excluding VAT
- Haulage = £2.50 / tonnes (include aggregates tax) (£4.50/m^3) excluding VAT

4.3.6 Costs of removing current waste on site for disposal for landfill have been provided by Gallaghers at a cost of £185 per load (£20.55/m^3) excluding VAT

4.3.7 Quotations for provision of the non-waste hassock material and removal of the waste on site for landfill can be found in **Appendix J.**

Table 4-1: Costs of Undertaking Works with Non-Waste (VAT excluded)

Activity	Cost (£ per m^3)	Volume Required (m^3)	Cost of activity (£)
Removal of Waste for disposal to landfill	£20.55	56,722	£1,165,637.10
Provision of non-waste hassock	£11.70	66,387	£776,727.90
Cost of removing, placing and compacting materials	£2.50	123,109*	£307,772.50
Total Cost			**£2,250,137.50**

* the cost of placing material has assumed £2.50 per m3 for the removal of waste from site as well as the cost of placement and compacting non-waste materials.

Table 4-2: Costs of Undertaking Works with Waste (VAT excluded)

Activity	Cost (£ per m^3)	Volume Required (m^3)	Cost of activity (£)
Provision of non-waste hassock	£11.70	9,572	£111,992.40
Cost of placing and compacting materials	£2.50	66,294	£165,735.00
Total Cost			**£277,727.40**

* the cost of placing material has assumed £2.50 per m3 for the removal of waste from site as well as the cost of placement and compacting non-waste materials.

4.3.8 The quotations provided in Appendix J do not include VAT. The tables below, show the costs with VAT included.

[7] https://www.gallagher-group.co.uk/hermitage-quarry

[8] https://www.gallagher-group.co.uk/blaise-farm-quarry

Table 4-2: Costs of Undertaking Works with Non-Waste (VAT inclusive)

Activity	Cost (£ per m^3)	Volume Required (m^3)	Cost of activity (£)
Removal of Waste for disposal to landfill	£24.66	56,722	£1,398,764.52
Provision of non-waste hassock	£14.04	66,387	£932,073.48
Cost of removing, placing and compacting materials	£3.00	123,109*	£369,327
Total Cost			**£2,700,165**

* the cost of placing material has assumed £3.00 per m3 for the removal of waste from site as well as the cost of placement and compacting non-waste materials.

Table 4-4: Costs of Undertaking Works with Waste (VAT inclusive)

Activity	Cost (£ per m^3)	Volume Required (m^3)	Cost of activity (£)
Provision of non-waste hassock	£14.04	9,572	£134,390.88
Cost of placing and compacting materials	£3.00	66,294	£198,882.00
Total Cost			**£333,272.88**

* the cost of placing material has assumed £3.00 per m3 for the removal of waste from site as well as the cost of placement and compacting non-waste materials.

4.3.9 The cost of placing and compacting materials has been included as a conservative cost of £2.50 m^3 (£3.00 including VAT). This cost has been based upon advice from Gallagher's a local civil engineering company and Taylor Associates who are Kent based cost consultants / project managers. They have provided this cost based on their knowledge experience of groundworks in the local area.

4.3.10 The cost of placing and compacting the material would be the same for non-waste as waste therefore no additional costs would be incurred for the use of non-waste, however, the overall cost of removing the waste material has been included in the table above as an overly conservative estimation of the development costs using non-waste.

4.4 Costs of Carrying out the Work with Non-Waste and any On-going Operating Costs

4.4.1 The costs to carry out the work have been detailed in section 4.3 above and is shown to be approximately £2.25 million (£2.70 million including VAT). This includes the removal of all waste currently on site, the importation of replacement hassock material and the cost of placement and compaction of this material to meet the required development levels.

4.4.2 The site is currently closed and non-operational. There is no day to day activity undertaken at the site and it remains locked at all times, except for site visits by the site owner for security purposes. There are no staff employed for the site and there are no current operating costs. Once the enabling works have been undertaken and the permit surrendered, the site will be sold to a developer and there will be no future operating costs associated with the site.

4.4.3 In addition to the financial costs that would be incurred using non-waste materials, there would also be the environmental costs of emissions from haulage of the materials out and in. Mileage one way per load for Hermitage Quarry is 5 miles and for Blaise Quarry is 8 miles. An average load consisting of 20 tonnes would require 1,858 journeys to site. If materials were sourced from both quarries, average journey being 6.5 miles, based on a CO_2 emission rate of 161.8 grams of

CO_2[9] per ton-mile, each journey would emit ~0.02 tonnes of CO_2 per journey which would equate to ~37.1 tonnes CO_2 over the operational lifetime of the site.

4.4.4 If waste materials are used, this material is already available on the site and therefore the travel miles for use of this material would be zero and by using waste materials gives a saving of ~37.1 tonnes CO_2 emissions.

4.5 Summary

4.5.1 As shown above, the site is currently valued in the range of £10 – £12 million. This is the value of the site in its current state with planning permission for the development of 272 houses.

4.5.2 There is an offer on the table to purchase the site for £15.75 million once enabling works have been completed, i.e. the cut/fill exercise undertaken to get the site to the required development levels.

4.5.3 The capital gain will range from £3.75 - £5.75 million if enabling works are completed and the agreed sale goes to completion.

4.5.4 To undertake the cut/fill exercise using non-waste materials and remove the waste currently on-site, it has been calculated that this cost would be approximately £2.25 million (£2.70 million including VAT). . To undertake the works using the waste material on site, and importing non-waste hassock materials to meet the deficit, it has been calculated that this cost would be approximately £278,000 (£333,000 including VAT).

4.5.5 The site is a closed landfill with no current operational activity. There are no operating costs for the site and no staff costs, maintenance or day to day operational costs to evidence. The site is locked at all times with the only on-site activities being regular checks for security by the site owner.

4.5.6 Based on the above, it is clearly demonstrated that it would be commercially worthwhile to undertake the works using non-waste material and this would result in financial gain for the site owner as soon as the site works have been completed and sold to the ongoing developer. There would be no further payback period following sale of the site. The net financial gain using non-waste materials would be as shown below in Tables 4-5 and 4-6:

Table 4-5: Demonstration of Financial Gain Using Non-Waste (VAT excluded)

Current Land Value	Cost of Enabling Works with Non-waste Materials	Land Sale Value Following Enabling Works	Operating Costs	Capital Gain	Financial Gain
£10 – £12 million	£2.25 million	£15.75 million	£0*	£3.75 - £5.75 million	£1.5 - £3.5 million

* Site is non-operational and closed, there are currently no associated operating costs

[9] https://business.edf.org/insights/green-freight-math-how-to-calculate-emissions-for-a-truck-move/

Table 4-6: Demonstration of Financial Gain Using Non-Waste (VAT included)

Current Land Value	Cost of Enabling Works with Non-waste Materials	Land Sale Value Following Enabling Works	Operating Costs	Capital Gain	Financial Gain
£10 – £12 million	£2.7 million	£15.75 million	£0*	£3.75 - £5.75 million	£1.05 - £3.05 million

* Site is non-operational and closed, there are currently no associated operating costs

5 EVIDENCE OF SUITABILITY OF THE WASTE

5.1 Overview

5.1.1 All the material to be used in preparing the site for re-development has been generated from either quarry spoil (non-waste) or from the landfilled waste screened therefore only waste materials which are suitable for the intended purpose will be used in the restoration of the site.

5.1.2 The waste materials to be used in the development of the site are shown in Table 3.1 above.

5.1.3 No additional waste materials from off-site are proposed, therefore, the risk of contaminated materials being incorporated in the development are low as all materials used have undergone screening and assessment.

5.1.4 The site has been the subject of a number of phases of intrusive Site investigation, with associated laboratory testing of representative samples dating back to 2004, with the most recent investigation occurring in December 2019.

5.1.5 Site investigations have been carried out by Knapp Hicks & Partners between 2013 and 2019 to obtain representative samples from across the site. A summary of the findings of these investigations can be found in Table 5.1 below:

Table 5-1: Knapp Hicks Site Investigations 2013 to 2019

Year	Scope of Investigations	Summary of Findings
2013	40 No machine dug pits 30 No Contamination Suites	Rare asbestos fibres (4 samples) Rare slight exceedances of metals (lead, arsenic) in 2 out 30 samples All TPH & BTEX parameters below guidance values Localised exceedances of PAH's
2017	26 No Machine Dug Trial Pits 10 No Contamination Suites Asbestos Quantifications	Minor exceedances of lead in 2 samples Asbestos fibres in 2 samples. Asbestos quantifications generally relatively low at <0.001% to 0.002%
2019	40 No machine dug trial pits from areas where existing ground level will be reduced 36 No Contamination Suites 36 No Waste Acceptance Criteria (leachate) tests) 5 No Ground Gas Wells installed Ground Gas Monitoring Groundwater samples obtained from 4 No wells (2No on PJ Burke site, 2 No on adjacent landfill site)	Contamination testing of representative samples taken from areas to be excavated to provide fill for re-profiling the site have generally found levels of contamination below assessment criteria for residential end use with private gardens. WAC testing identified sulphate levels above the assessment criteria for inert waste and antimony levels were close to the upper level for inert waste. 12 of the 36 samples identified asbestos fibres. Quantification analysis identified that 7 samples had asbestos levels below 0.001%w/w. The remaining 5 samples identified asbestos levels at between 0.002% and 0.007%. Groundwater samples did not identify any criteria exceeding drinking water quality standards with the exception of some elevated sulphates in KCC borehole TV-S3 located on the adjacent site to the south.

5.1.6 Stockpiles 1 to 6 have undergone chemical analysis at each phase of site investigation and the levels of contamination are below the accepted assessment criteria for residential end use. This therefore demonstrates that they are suitable materials to be used as general fill and therefore will be used to fill the lower levels of the quarry to ensure that any local levels of contaminants will be buried at significant depth.

Several phases of investigation and associated testing at the site have concluded that it is generally lacking in contamination that would represent a risk to construction workers or the end-users.

5.2 Physical Properties

5.2.1 The physical properties of the main site-won bulk fill materials to be incorporated in the works are detailed in the Earthworks Specification (Knapp Hicks & Partners, 2017) which is included as **Appendix D**. These are based on the Department of Transport Specification for Highways Works, Series 600, earthworks (2001). Three classes of materials have been identified and based on their gradings and other properties, classify as follows:

- Class 2A (Wet cohesive fill) – clay fill stored on site
- Class 2B (Dry cohesive fill) – a small proportion of the quarry waste / hassock material type material available in the north east portion of the site
- Class 2C – most of the stockpile materials (stockpiles SP1 to SP8) based on samples taken in June/July 2017, and most of the quarry waste based on samples taken in March 2017.

5.2.2 Chemical testing results is included in **Appendix C** of the earthworks specification and discussed further below.

5.2.3 The summary of the classification tests for each material following compaction/suitability testing is as follows:

- Quarry Fill – 2A/2B/2C
- Clay – 2A/2B
- Stockpiles 1 to 8 – 2C

5.2.4 A dedicated groundworks contractor is to be appointed and ensure that all works will be carried out to meet strict criteria to allow the site to be re-developed with housing and associated infrastructure, be protective of human health and the environment. The contractor will be required to prepare a management system for operation of the site to include such details as waste management procedures, accident management plan and emissions control procedures. The contractor will be required to ensure compliance with all environmental permit conditions for the Waste Recovery Plan throughout operation at the site.

5.2.5 The finished scheme will be constructed with minimal risks to the environment from soil erosion, pollution or increased risk of flooding. This will be evidenced as part of the Environmental Risk Assessment supporting the permit application.

5.2.6 The physical property testing has concluded that materials from Stockpiles 1 - 6 are suitable for use as general fill and compacted to highways specification method compaction.

5.3 Chemical Properties

5.3.1 36No. samples were taken from the localised stockpiles of site-won material on site and from 40No. trial pits spread across the areas of the site.

5.3.2 A summary of chemical analysis can be found in Tables 5-2 below:

Table 5-2: Summary of Soil Analysis

Determinand	Units	Minimum Concentration	Maximum Concentration
pH	pH Units	7.5	9.4
Total Cyanide	mg/kg	3.0	5.0
Total Sulphate as SO_4	mg/kg	325.0	4698.0
Total Sulphate as SO_4	%	0.0	0.5
W/S Sulphate as SO_4 (2:1)	mg/l	15.0	1,630.0
W/S Sulphate as SO_4 (2:1)	g/l	0.0	1.6

Organic Matter	%	0.5	5.2
Total Organic Carbon (TOC)	%	0.3	3.0
Ammoniacal Nitrogen as NH_4	mg/kg	9.3	27.0
Arsenic (As)	mg/kg	10.0	26.0
Cadmium (Cd)	mg/kg	0.2	11.1
Chromium (Cr)	mg/kg	9.0	50.0
Chromium (hexavalent)	mg/kg	0.0	0.0
Copper (Cu)	mg/kg	5.0	359.0
Lead (Pb)	mg/kg	10.0	642.0
Mercury (Hg)	mg/kg	1.0	4.2
Nickel (Ni)	mg/kg	13.0	68.0
Selenium (Se)	mg/kg	0.0	0.0
Vanadium (V)	mg/kg	20.0	102.0
Zinc (Zn)	mg/kg	26.0	932.0
Total Phenols (monohydric)	mg/kg	0.0	0.0
Phthalene	mg/kg	0.1	0.4
Acenaphthylene	mg/kg	0.1	0.7
Acenaphthene	mg/kg	0.1	1.3
Fluorene	mg/kg	0.1	1.8
Phenanthrene	mg/kg	0.1	24.1
Anthracene	mg/kg	0.1	4.6
Fluoranthene	mg/kg	0.3	27.9
Pyrene	mg/kg	0.3	21.0
Benzo(a)anthracene	mg/kg	0.1	8.2
Chrysene	mg/kg	0.2	6.3
Benzo(b)fluoranthene	mg/kg	0.2	8.2
Benzo(k)fluoranthene	mg/kg	0.2	2.0
Benzo(a)pyrene	mg/kg	0.2	6.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	3.7
Dibenz(a,h)anthracene	mg/kg	0.1	0.5
Benzo(ghi)perylene	mg/kg	0.1	2.7
Coronene	mg/kg	0.2	1.0
Total Oily Waste PAHs	mg/kg	1.3	35.0
Total Dutch 10 PAHs	mg/kg	1.0	76.3
Total EPA-16 PAHs	mg/kg	1.9	106.0
Total WAC-17 PAHs	mg/kg	1.9	106.0
Aliphatic >C5 - C6	mg/kg	0.0	0.0
Aliphatic >C6 - C8	mg/kg	0.0	0.0
Aliphatic >C8 - C10	mg/kg	0.0	0.0
Aliphatic >C10 - C12	mg/kg	13.0	13.0
Aliphatic >C12 - C16	mg/kg	52.0	52.0
Aliphatic >C16 - C21	mg/kg	43.0	43.0
Aliphatic >C21 - C34	mg/kg	27.0	27.0
Aliphatic (C5 - C34)	mg/kg	134.0	134.0

Aromatic >C5 - C7	mg/kg	0.0	0.0
Aromatic >C7 - C8	mg/kg	0.0	0.0
Aromatic >C8 - C10	mg/kg	0.0	0.0
Aromatic >C10 - C12	mg/kg	0.0	0.0
Aromatic >C12 - C16	mg/kg	2.0	18.0
Aromatic >C16 - C21	mg/kg	7.0	93.0
Aromatic >C21 - C35	mg/kg	16.0	120.0
Aromatic (C5 - C35)	mg/kg	37.0	186.0
Total >C5 - C35	mg/kg	46.0	263.0
Benzene	ug/kg	< 2	< 2
Toluene	ug/kg	< 5	< 5
Ethylbenzene	ug/kg	< 2	< 2
p & m-xylene	ug/kg	< 2	< 2
o-xylene	ug/kg	< 2	< 2
MTBE	ug/kg	< 5	< 5

5.3.3 The results have indicated negligible to very low levels of contaminants and the Waste Acceptance Criteria (WAC) testing has only detected the following in a proportion of the samples:

- Sulphate levels exceeding the upper level for inert waste but not at a level requiring SR cement;
- Antimony levels close to the upper level for inert waste.

5.3.4 All samples were screened for asbestos and, where asbestos waste detected, a quantification analysis was carried out. Of 12 samples submitted for asbestos quantification, 7 had levels <0.001% w/w while the other samples had asbestos present at between 0.002% and 0.007% w/w. This is below the guidance threshold of 0.01%.

5.3.5 It is proposed that even though the asbestos detected is below guidance thresholds, the piles where asbestos is detected will be placed as fill materials in the base of areas to be filled so as to minimise any risk of contact once the site has been developed.

5.3.6 Groundwater testing has been carried out from 4 boreholes located around the site perimeter. Results have indicated reasonable water quality within the site when compared with Drinking Water Standards, and in comparison, to the water quality within the adjacent landfill, which is impacted by ammonia.

5.3.7 The chemical testing has concluded that there is no significant contamination noted in any test areas.

5.3.8 Trial pit locations plan, logs and photos showing the makeup of the ground within the landfill site can be found within the TP & BH Log and Monitoring Data report included in **Appendix H**.

5.3.9 Monitoring data and analysis can also be found in **Appendix H**.

6 CONCLUSIONS

6.1.1 The waste recovery plan has made an assessment of the activity following the Environment Agency guidance on Waste recovery plans and permits[10] and has concluded the following:

Purpose of the Work

6.1.2 The site has been identified as a key housing area for the Maidstone area and planning permission has been granted by MBC for development of the site for 272 dwellings. Remediation of the site is required to allow re-development under a planning permission for residential and associated infrastructure. Such re-development cannot be undertaken without remediation, re-profiling and recontouring of the site. In order to achieve this, material needs to be placed in order to achieve the desired levels for the development of the site.

6.1.3 Works will be carried out with waste materials available on site and import of non-waste hassock material to meet the deficit of materials. It has been identified that some of the waste materials on site, will require further processing and treatment comprising crushing of over-sized ragstone in order to prepare for use as fill material. The works will be carried out in phases to allow for the materials to be moved around the site from areas of cut to areas of fill and allowing for treatment (screening and crushing) of oversized materials where required.

Quantity of Waste Used

6.1.4 The material to be used for reprofiling and recontouring is already present on site, with the deficit being met using imported hassock material. The material to be used is the inert wastes that have been excavated from the landfill and quarrying and then screened plus a balance of imported material. No additional waste material is to be sourced for the development and final profiles of the site will be achieved using on site earthworks construction materials (ragstone and hassock) and topsoil materials or road construction materials.

6.1.5 The site has been granted planning permission based on consideration of the surrounding land, the need for gradual gradients to produce gentle slopes for roads, paths and gardens, and to avoid large retaining structures within or at the perimeter. Other options for the site using less material have been dismissed for the above reasons.

6.1.6 In order to minimise the amount of waste material, a decision has been made to import non-waste hassock to meet the deficit of materials on site for the development, rather than source additional waste material.

Meeting Quality Standards

6.1.7 Testing has indicated that the waste materials to be used in the waste recovery activity are suitably uncontaminated and that their geotechnical properties are acceptable for use as engineering fill to reprofile the site.

6.1.8 The physical properties of the main site-won bulk fill materials to be incorporated in the works are classified as follows, based on the Department of Transport Specification for Highways Works, Series 600, earthworks (2001):

- Class 2A (Wet cohesive fill) – clay fill stored on site
- Class 2B (Dry cohesive fill) – a small proportion of the quarry waste / hassock material type material available in the north east portion of the site
- Class 2C – most of the stockpile materials (stockpiles SP1 to SP8) based on samples taken in June/July 2017, and most of the quarry waste based on samples taken in March 2017.

[10] https://www.gov.uk/guidance/waste-recovery-plans-and-permits#waste-recovery-activities

6.1.9 The finished scheme will be constructed with minimal risks to the environment from soil erosion, pollution or increased risk of flooding. This will be evidenced as part of the Environmental Risk Assessment supporting the permit application.

6.1.10 The physical property testing has concluded that materials from Stockpiles 1 - 6 are suitable for use as general fill and compacted to highways specification method compaction.

Financial Gain by Using Non-waste Materials

6.1.11 It has been demonstrated that the site with no further works undertaken has a commercial value in the range of £10 – £12 million. The cost of the restoration using non-waste materials will cost approximately £2.25 million (£2.70 million including VAT). . Once the restoration cut/fill works has been undertaken, the land has a sale value of £15.75 million.

6.1.12 Based on these figures of land valuation and costs to undertake the work using non-waste, the capital gain will range from £3.75 - £5.75 million if enabling works are completed and the agreed sale goes to completion. This demonstrates that it would be commercially worthwhile to use non waste to undertake the restoration.

6.1.13 There are no operating costs currently associated with the site as it is a closed site with no activity being undertaken. There are no staff or on-site costs associated with the site. Accordingly, the financial gain will be £1.5 - £3.5 million (£1.05 - £3.05 million excluding VAT), should the work be undertaken with non-wastes based on the current market value of £10 - £12 million,

6.1.14 The Waste Framework Directive (WFD)[11] states that the recovery of waste and the use of recovered materials as raw materials should be encouraged in order to conserve natural resources. This scheme meets these fundamental requirements.

6.1.15 The proposed scheme will allow waste to move up the waste hierarchy by enabling recovery and reuse instead of disposal. The use of waste as a replacement for non-waste materials will conserve natural resources in line with Article 1 of the Waste Framework Directive.

6.1.16 As shown above, the proposed use of the waste meets all the requirements to be deemed a waste recovery activity rather than waste disposal.

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098

GLOSSARY

BTEX	Benzene, Toluene, Ethylbenzene and Xylene
DEFRA	Department for Environment, Food & Rural Affairs
EA	Environment Agency
EMMS	Earthworks Materials Management System
EWC	European Waste Catalogue
GSPZ	Groundwater Source Protection Zones
KCC	Kent County Council
MBC	Maidstone Borough Council
Mbgl	Metres Below Ground Level
NPPF	National Planning Policy Framework
TPH	Total Petroleum Hydrocarbons
WFD	Waste Framework Directive

APPENDICES

Appendix A

Site Plans

Appendix B

Proposed Development Plans

Appendix C

Areas and Stockpile Characterisation

Appendix D

Earthworks Specification

Appendix E

Remediation Strategy

Appendix F

Reclamation Method Statement

Appendix G

Materials Management Plan

Appendix H

TP & BH Log and Monitoring Data

Appendix I

Valuation Reports

Appendix J

Quotations

Appendix K

Southern Testing 2004 Borehole Logs