A12 Chelmsford to A120 widening scheme

TR010060

9.56 Borrow Pits Summary Report

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A12 Chelmsford to A120 widening scheme

Development Consent Order 202[ ]

Borrow Pits Summary Report

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1 Introduction

1.1 Purpose of this report

1.1.1 The purpose of this summary report is to clarify:

- the volumes calculated, and how this relates to the area of land required for the borrow pits.
- the alternatives investigated, and why they were discounted.
- the requirements from each borrow pit and why they were selected.
- the gist of the borrow pits cost information.

2 Volumes

2.1 Clarification of numbers provided

2.1.1 The earthworks volume calculations that determined the deficit of earthworks material is detailed in the Borrow Pits Supplementary Technical Note [REP1-011] in Section 3.

2.1.2 A summary is included here:

Table 2.1 Summary of volumes

Element	Volume (m^3) [1]
General earthworks material required to construct the proposed scheme	1,900,000
General earthworks material available within proposed scheme excavations	1,300,000
Deficit of general earthworks material required to be won	600,000
Granular engineering material required to construct the proposed scheme	445,000
Note 1. Volumes have been taken from the **Borrow Pits Supplementary Technical Note** [REP1-011] **Table 3.2** and have been rounded for simplicity.	

2.1.3 The above principal volumes are also represented graphically in Plate 2.1 to explain their relationship.

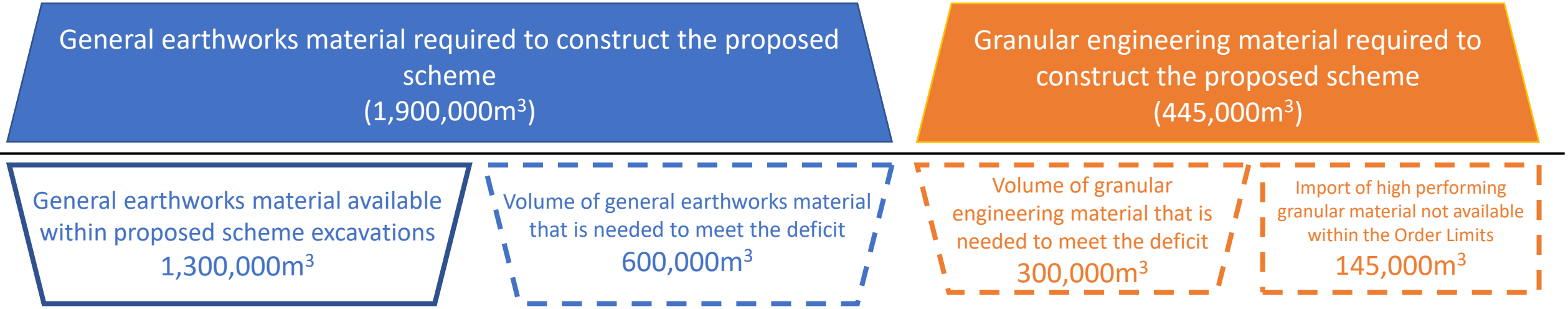
2.1.4 In Plates 2.1 to 2.4, the boxes shown above the black line indicate the materials and quantities required to construct the proposed scheme.

2.1.5 The boxes below the black line show how the Applicant is planning to meet the above need.

2.1.6 Much of the overall requirement for earthworks materials (1,900,000m3) along the scheme is required at junctions 21 and 22. As 1,300,000 m3 is available to be won from cuttings along the scheme, there is an overall deficit of 600,000m3, which is proposed to be supplied from borrow pits as close as practicable to the junctions.

2.1.7 The granular engineering material is a separate volume requirement to provide backfill material to structures along the length of the proposed scheme, as well as for other purposes. Typically, this does not include general earthworks material.

Plate 2.1 A12 Proposed Scheme Earthworks Volumes Plan



2.1.8 The deficit volumes have been broken down further in Plate 2.2 to show how the general fill material deficit of 600,000m3 and granular engineering material deficit of 445,000m3 will be met.

2.1.9 Borrow Pits E and F will secure the deficit of 200,000m3 at the proposed Junction 21.Borrow Pit I will secure the deficit of 400,000m3 at the proposed Junction 22. Together, Borrow Pits E, F and I will meet the general fill material deficit of 600,000m3.

2.1.10 Of the 445,000m3 deficit of granular engineering material, 145,000m3 cannot be met from borrow pits in the Order Limits because it needs to be high performing aggregates, that are not available in this area and need to be sourced through national aggregate suppliers that have access to these materials.

2.1.11 The remaining 300,000m3 deficit can be met through the Order Limits from Borrow Pit J.

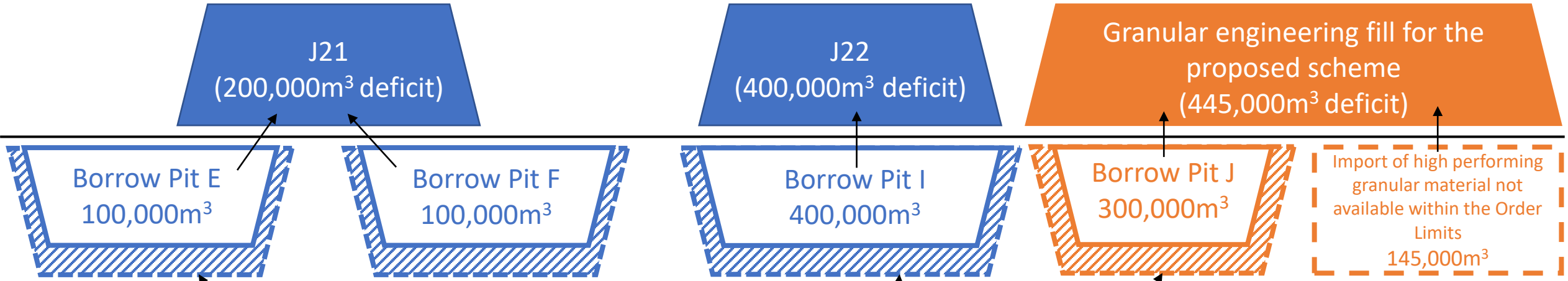
2.1.12 The detail of why these borrow pits are necessary to meet the deficit is provided in Section 4 of this report.

2.1.13 The hatched areas around the borrow pits indicatively represent the volume of unsuitable material that naturally occurs within the borrow pit.

2.1.14 This means that the overall excavation size during construction will be larger than the void left post construction.

The worst-case residual void volume is shown by the numbers in Plate 2.2.

Plate 2.2 A12 Proposed Scheme Earthworks Deficit Plan



Total general earthworks fill material to win from borrow pits
600,000m³

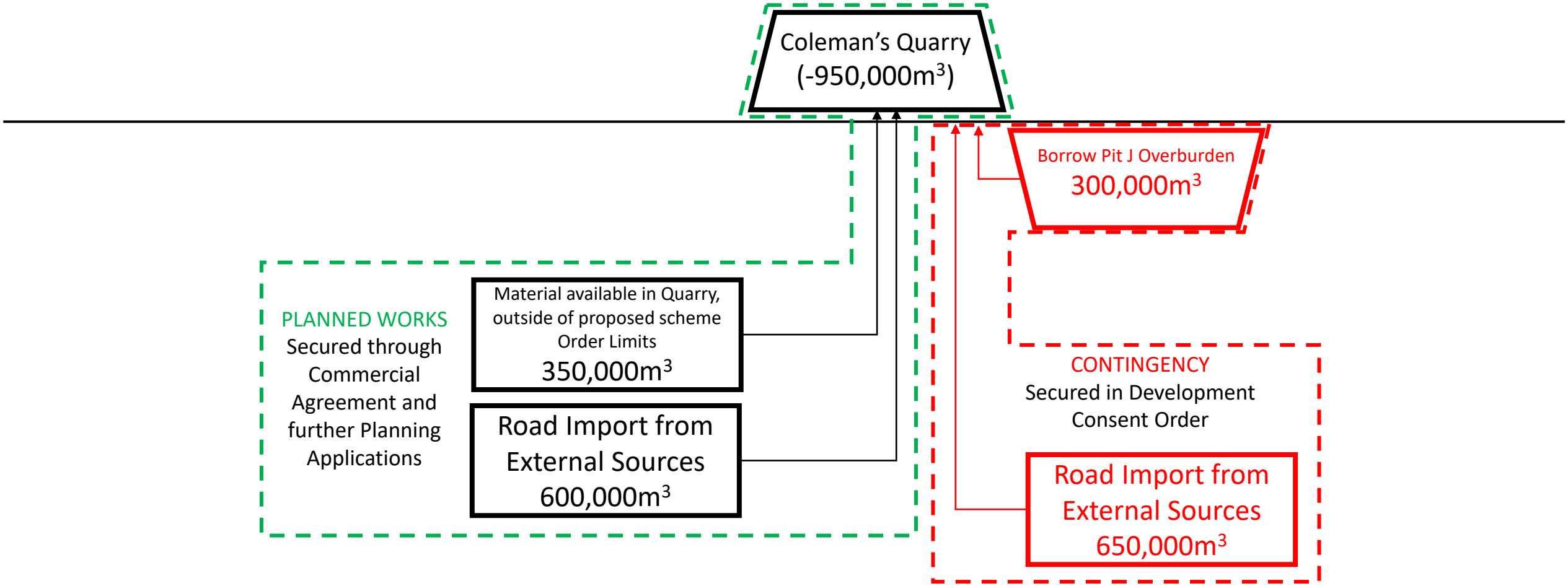
Overall excavation footprint of borrow pit.
Hatched area represents the volume of unsuitable material within the ground.
Unsuitable material excavated from within the borrow pit will remain in the borrow pit to keep the void volume as indicated here.

2.1.15 A separate plate has been prepared to explain the planned work and contingencies included for the proposed scheme to backfill Coleman's quarry in advance of the proposed scheme junction works. This is shown in Plate 2.3.

2.1.16 The items included within the green box form the planned works which have been secured through the commercial agreement and further planning applications that have been accepted by the local planning authority.

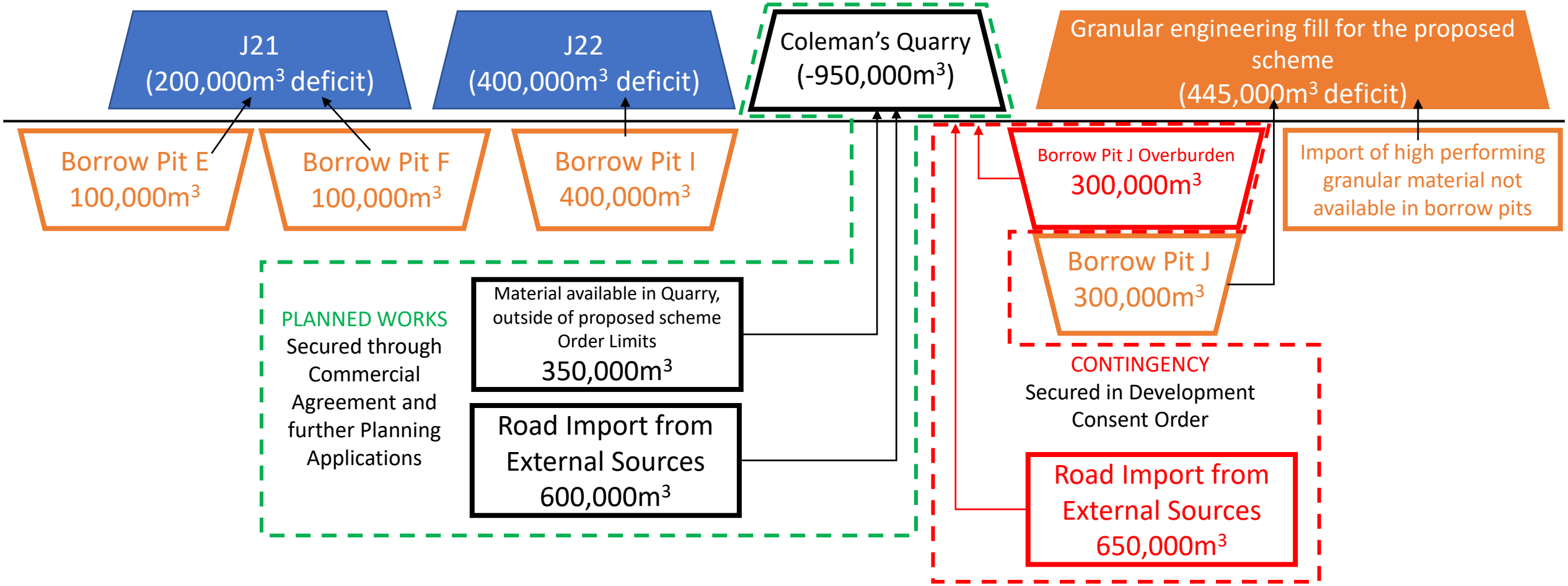
2.1.17 The items within the red box represent the contingency plan that has been included for within the environmental assessment for the unlikely event that the quarry operator cannot backfill the quarry to meet the programme for delivery or to the required specification.

Plate 2.3 A12 Proposed Scheme Quarry Contingency Plan



2.1.18 The above plates have then been combined to form an updated version of the slide that was introduced into Issue Specific Hearing 3, provided in Appendix A - 9.53 of the Applicant's Written Response to ISH3. This has been updated for further clarity and is shown in Plate 2.4.

Plate 2.4 A12 Proposed Scheme Combined Volumes Plan



2.2 Land space required for operating borrow pits

2.2.1 Operating a borrow pit requires space for the following activities:

- Excavation of target material
- Haul routes around the borrow pit to safely move the excavated or backfill material in or out
- Temporary storage of topsoil and subsoil
- Perimeter drainage
- Water management areas to set up and maintain pumping equipment, treat pumped water (settlement or recharge lagoons) and then safely discharge it to watercourses or groundwater.
- Welfare for operatives working in the borrow pit
- Areas for processing the excavated material to ensure it meets the required specification
- Areas for handling any imported unsuitable material so that it can be placed in the borrow pit, for the purposes of borrow pit restoration, with the appropriate off-road machinery.
- Suitable exclusion zones from existing buried or overhead utilities and public rights of way that are not being temporarily or permanently diverted.
- Areas to park earthworks plant and for refuelling activities.

2.2.2 Please refer to the below image in Plate 2.5, taken from the Borrow Pits Report [APP-278] Plate 3.1, to demonstrate what the working area of a borrow pit looks like in practice.

Plate 2.5 Photograph of a working borrow pit (credit: Selwood; Michael Kheng, Kurnia Aerial Photography)

2.2.3 The approximate borrow pit areas (or footprints) are provided in the Borrow Pits Report [APP-278] paragraph 5.4.4. These figures include space for the essential activities given in 2.2.1 above.

2.2.4 As such, the *excavated* footprint of the borrow pit is smaller than the *total* footprint stated in the Borrow Pits Report [APP-278] paragraph 5.4.4.

2.2.5 The maximum borrow pit depths stated in the Borrow Pits Report [APP-278] section 6 are a product of professional judgment taking into consideration:

- the local topography
- the depth at which the target material is anticipated
- the varying quality of material in the ground (based on ground investigations)
- and the anticipated depth of groundwater

to ensure the required volume of material to be won is secured.

2.2.6 The stated maximum depths also provide contingency against the risk of where palaeolithic archaeology may sterilise excavation areas within the borrow pit, based on the information available. This allows excavations to be deeper in

certain areas of the borrow pits to avoid the archaeology if it is encountered in other areas of the borrow pits.

2.2.7 Based on the above, the volume of material to be won from each borrow pit cannot simply be divided by the area provided in previous reports to attain the maximum excavation depth for the borrow pit.

The land space required for a borrow pit and the maximum depth of the borrow pit are not directly proportional to the volumes which can be extracted, and other factors which require the application of professional judgement must be considered.

2.2.8 The areas included within the proposed scheme Order Limits allocated for borrow pit space and the maximum depths stated in the Borrow Pits Report [APP-278] which are needed to achieve the required volumes have been determined through the application of professional judgement with consideration of all the elements summarised above.

2.3 Volumes conclusion

2.3.1 The volume of fill required and presented in each of the previous borrow pit reports has not changed and can be fully relied on as accurate.

2.3.2 The volumes sought to be met through the borrow pits are fully justified by reference to the deficit calculations (detailed in the borrow Pits Supplementary Technical Note [REP1-011]) and again, are consistent with the original presentation in the Borrow Pits Report [APP-278]. Full confidence can therefore be had in those figures.

2.3.3 The approach to the calculation of borrow pit footprint and depth to achieve the volumes required has been carefully considered by professional experts with reference to environmental impacts as well as technical constraints to ensure that risks to delivery through inability to achieve the required volumes and quality of material can be managed appropriately.

2.3.4 The volumes associated with the backfill of Coleman's Quarry are complete separate to and distinct from the volumes required for the proposed scheme earthworks because they form part of:

- a planned set of mitigation works, put in place before the construction of the proposed scheme commences, and
- are considered to be a low-risk contingency, but which have the potential to affect a range of environmental aspects (such as green house gas emissions from fuel transport volumes) and have been assessed within the Environmental Statement accordingly.

3 Options for importing the deficit volume

3.1 Investigation / Analysis

3.1.1 The below information is detailed in the Borrow Pits Supplementary Technical Note [REP1-011] in Section 4 and summarises the conclusions drawn on the options for fulfilling the earthworks material deficit.

Table 3.1 Import options analysis

No.	Description	Detail	Summary of reasons for including or discounting
1	Import from open market	Four sources were considered as part of this exercise. All of which are national/regional construction aggregates suppliers that operate local to the proposed scheme. This includes the use of local railheads.	• There are a number of local quarries that can provide a supply of high-performing aggregates to the proposed scheme. However, availability of the target materials cannot be guaranteed in the rates/quantities that are required. • Cost of the material is the highest of the three options considered. • The import rate at which it can be supplied is slow. This carries a significant risk to the proposed scheme programme with substantial cost risk from delays that could be incurred without further mitigation. • The transport impacts on the road network and subsequent environmental impacts are significantly worse than the borrow pit alternative. • Significant volumes of excavated material unsuitable for re-use on the proposed scheme will have to be exported off-site, potentially to landfill. This is worse than the borrow pits

No.	Description	Detail	Summary of reasons for including or discounting
			alternative, because this material can be used to restore the borrow pit areas.
2	Import from other development projects	A search on the National Infrastructure Planning portal and 22 local planning authorities that fall within a one-hour journey time from the centre of the proposed scheme, provided 25 developments to assess for viability.	• Many of the schemes are not yet consented and therefore the availability of the target materials is not certain. • Cost of the material is the second highest of the three options considered. • The import rate at which it can be supplied is slow. This carries a significant risk to the proposed scheme programme with substantial cost risk from delays that could be incurred without further mitigation. • The transport impacts on the road network and subsequent environmental impacts are significantly worse than the borrow pit alternative. • Significant volumes of excavated material unsuitable for re-use on the proposed scheme will have to be exported off-site, potentially to landfill. This is worse than the borrow pits alternative, because this material can be used to restore the borrow pit areas.
3	Import from Borrow Pits within the Order Limits	A total of 19 potential borrow pit locations were assessed for the availability of the materials required and any potential impacts arising from construction activities associated with extracting the material.	• Availability of the required quantity and quality of materials is guaranteed. • The cost of sourcing, transporting and placing the material is the cheapest when compared to the other alternatives. • Control is gained over the rate of import and when it is required, which reduces the risk and dependency on other

No.	Description	Detail	Summary of reasons for including or discounting
			external factors that may delay the construction programme and lead to increased cost risks resulting from programme delays. • Borrow pit locations can be selected considerably closer to the area that they would need to supply when compared to the other options. This reduces the impacts from transport movements on the road network and the subsequent environmental impacts are significantly less than the other alternatives. • Excavated material that is unsuitable for re-use on the proposed scheme can be managed within the proposed scheme Order Limits to contribute to restoring the borrow pit areas, and significantly reduces the need for it to be exported off-site, potentially to landfill.

3.1.2 A summary of the cost and environmental impacts are given in Table 3.2.

3.1.3 The environmental impact information specific to the Green House Gas (GHG) emissions is referenced from response 2.14.1 from the Applicant's response to ExQ2 [REP4-055].

3.1.4 The cost information for each option is referenced from the Borrow Pits Supplementary Technical Note [REP1-011] section 4 and the Borrow Pits Cost Information [REP3-023].

Table 3.2 Environmental and cost impacts for import options

No.	Description	Environmental impact associated with material haulage	Cost of option (per m^3)
1	Import from open market [1]	General earthworks fill volume to be transported = 600,000m3 GHG emissions = **14,619 tonnes of carbon dioxide equivalent (tCO2e).**	**£71** for general earthworks fill material
		Granular engineering fill volume to be transported = 300,000m3 GHG emissions = **7,310 tCO2e**	**£114** for granular engineering material
2	Import from other development projects [1]	General earthworks fill volume to be transported = 600,000m3 GHG emissions = **14,619 tonnes of carbon dioxide equivalent (tCO2e).**	**£57** for general earthworks fill material
		Granular engineering fill volume to be transported = N/A GHG emissions = N/A	£N/A for granular engineering material
3	Import from borrow pits within the Order Limits [2, 3]	General earthworks fill volume to be transported = 600,000m3 GHG emissions = **859 tCO2e**	**£29** for general earthworks fill material
		Granular engineering fill volume to be transported = 300,000m3 GHG emissions = **552 tCO2e**	**£88** for granular engineering material

Note 1. Assumed haul distance (each way) = 50km (to-site) and 12.5km (maximum distance within A12 site)

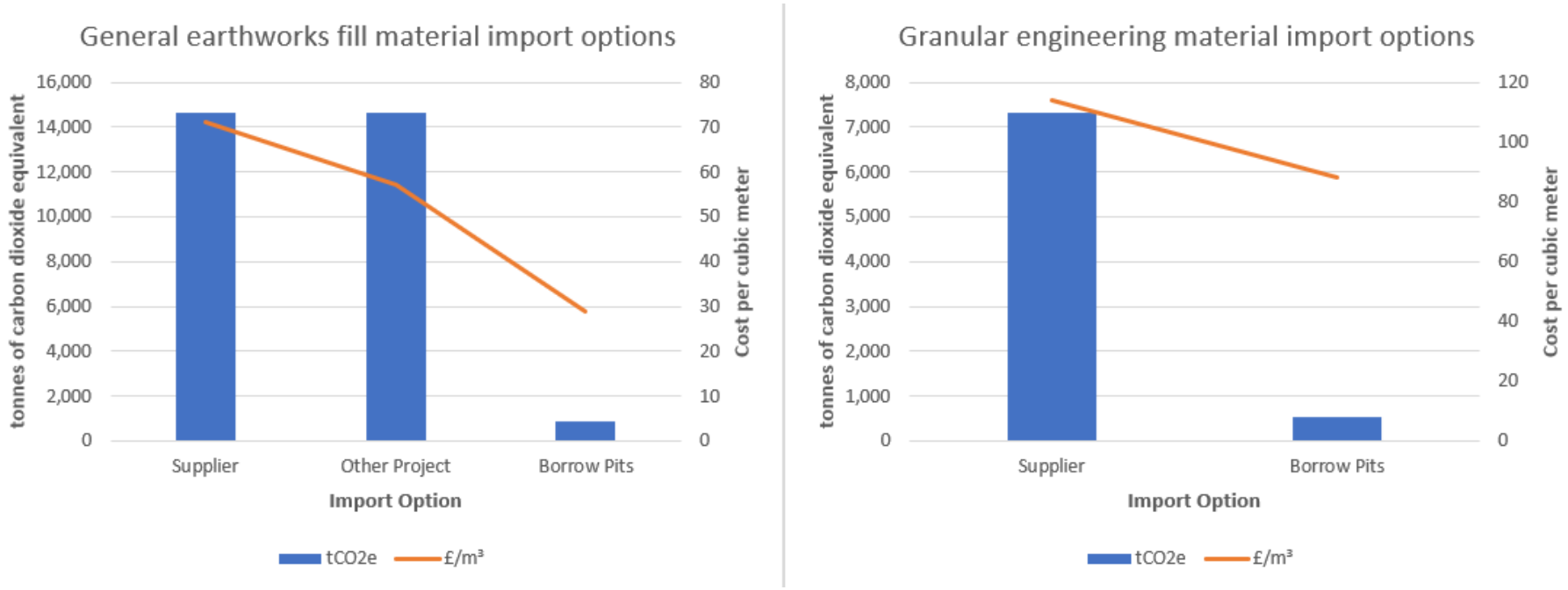
Note 2. General earthworks fill material average haul distance (each way) for off-road dump truck = 1km, and average haul distance (each way) for road lorry = 4km

Note 3. Granular engineering material average haul distance (each way) for off-road dump truck = 1km, and average haul distance (each way) for road lorry = 5km

3.1.5 Table 3.2 shows that the cost and environmental impacts vary significantly between the two approaches of importing from external sources versus using borrow pits within the Order Limits.

3.1.6 This is also represented graphically in Plate 3.1. Lower values for both tonnes of carbon dioxide equivalent and the cost per cubic meter are the preferred outcome.

Plate 3.1 Graphical representation of GHG emissions and cost for each import option



3.1.7 As seen in Plate 3.1, winning the deficit material from borrow pits within the proposed scheme Order Limits is the most cost effective and has the lowest greenhouse gas emissions of the options assessed.

3.1.8 Importing material from external sources is more expensive than using borrow pits because the rate of supply of material into the proposed scheme is significantly slower, meaning earthmoving equipment is underutilised and the proposed scheme programme is lengthened to allow the full volume of material to be brought in.

3.1.9 Importing from external sources also attracts increased risk to the project relating to certainty of the quality of the product, the rate of its supply and also the safety aspects of transporting it in and out of site.

3.1.10 The safety hazards involved in winning material from borrow pits can, mostly be controlled within the site with modern machinery and good site management. The challenging hazard to control evolves around merging site traffic to the road network, which will exist in all of the above options, but is exacerbated if significant volumes of material are required to be imported from external sources.

3.1.11 This increases the likelihood of a road traffic accident associated with the merging of construction traffic and the general travelling public, which inherently increases the level of mitigation that needs to be put in place for it.

3.1.12 This could include enforcing slower temporary speed restrictions or limiting the number of merge points onto the road network, which would further hamper the import rate that could be achieved.

3.1.13 As a result of the above analysis, the direct works associated with importing deficit fill material in the volumes required are more expensive, have increased commercial and safety risks, and the total preliminary or overhead costs are greater. Therefore, using borrow pits to fulfil the proposed scheme earthworks deficit is therefore a preferable solution.

3.2 Using a ‘blended’ approach to fulfilling the deficit requirement

3.2.1 A very detailed and considered assessment of borrow pit sites was conducted to ensure that they are located at the most appropriate sites relative to their purpose and to minimise environmental impacts as set out in Borrow Pits Supplementary Technical Note [REP1-011], summarised below in Section 4 of this report. Therefore, using a blended approach does not allow for the numerous considerations which are balanced in determining the most appropriate site locations for the borrow pits and does not realise the environmental and other benefits to the same extent.

3.2.2 For example, given the significant cost and environmental impact difference between using borrow pits and importing from external market sources, a ‘blended’ approach will only increase cost and traffic/environmental impacts when compared to the borrow pit solution proposed for the scheme. Further detail is provided in 9.53 the Applicant’s response to ISH3 in section 6.11, with a summary of outcomes provided in Table 3.3 below.

Table 3.3 Potential outcomes from a blended approach to winning deficit material

Example	Borrow pit cost and environmental impact	External import cost and environmental impact	Combined / blended impact cost and environmental impact
Reduce volume won from each borrow pit, or delete a borrow pit, and increase volume imported from external sources	**Cost** Cost of material won (per m^3) may increase because large cost elements (such as land costs, temporary works and utilities costs) may not be reduced by winning less material from a particular borrow pit. Deleting a borrow pit will reduce land and temporary works costs, however this is likely to be offset by a need for further temporary works to manage the increased amount of road import from external sources. Therefore the cost associated with winning material from borrow pits may reduce, but is likely to stay relatively constant.	**Cost** Cost of material imported from external sources (per m^3) is unlikely to change much because this is predominantly driven by the cost of buying and transporting the material to site.	**Cost** The overall cost of winning material for the proposed scheme will increase because the rate cost (per m^3) could be an average of a slightly higher borrow pits rate combined with the rate to import material from external sources, which is vastly higher. The product will therefore be a higher cost based on the percentage split that is imported from external sources.
	Environmental Environmental impacts on local receptors may not be reduced or avoided because the area required to excavate the required material may not be reduced.	**Environmental** Environmental impacts on the climate (by GHG emissions) will increase significantly from the increased number and distance of road journeys.	**Environmental** Whilst there is a potential opportunity to reduce local impacts from construction activities at borrow pit areas, this is not certain. Also the impacts on the climate (by GHG

Example	Borrow pit cost and environmental impact	External import cost and environmental impact	Combined / blended impact cost and environmental impact
	Deleting a borrow pit will reduce impacts on specific local receptors. The construction activities associated with borrow pits will not change; however, they may occur over a shorter period if the volume of material to be won is reduced.	Impacts on local receptors (by noise and air quality) could increase from the traffic impacts of already high exposure levels. Increases for all aspects of the environment will be a function of the percentage split that is imported from external sources.	emissions) will increase significantly from the increased number and distance of road journeys. Impacts on local receptors (by noise and air quality) could increase from the traffic impacts of already high exposure levels.

3.2.3 Considering the above information, attempting to 'blend' the approach for winning earthworks deficit material (or use one of the alternative options for that matter) will dilute the benefits and increase the risk and impacts that using the borrow pits can provide.

3.2.4 Greater volumes of the deficit material required will need to be driven on the road network in lorries that will have to travel longer distances to complete the journey. The limited size of the lorries and the distance they need to travel will mean that significant numbers of lorries will be required every day to move the earthworks material to attempt to maintain an efficient earthworks operation. This will mean that the peak construction traffic and environmental impacts associated with large scale import from external sources may be experienced over a longer period of time, bringing unnecessary detriment to the local receptors.

3.2.5 Furthermore an increasing reliance on road import from external sources will:

- increase construction risks to the project, through reduced certainty (in sourcing and quality of material, plus the import rate achieved), which may lead to an increased import duration that would need to be mitigated through inefficient working (ie through winter).

- Cause a necessity to rely on higher grade materials to ensure the project remains on programme, which is both a costly and inappropriate use of such materials.
- Increase the temporary works elements required to facilitate a different earthworks strategy, of increasing the number of work fronts and using road-going vehicles. As mentioned in the Borrow Pits Supplementary Technical Note [REP1-011], this could include factors such as more and longer aggregate built haul roads and more construction plant to double/treble-handle the imported material.
- Increase the safety hazards associated with the earthworks operations, including the logistics of merging the construction traffic with the road network traffic.

3.2.6 Therefore considerable mitigation would likely be required to avoid a consequential delay to the delivery of the proposed scheme, making it more expensive to deliver the earthworks, with associated increases in overall preliminary costs.

3.2.7 A key reason for the inclusion of borrow pits is to reduce environmental impacts, the borrow pits and their associated quantities and materials to be extracted have been sited to give effect to this. The full environmental benefits would not be achieved if a ‘blended’ approach is adopted. Similarly, scheme costs would increase both directly (through increased haulage) and indirectly through mitigation measures that would be needed to be introduced to reduce the risk of delay to project delivery.

4 Borrow pit selection

4.1.1 The below information in Table 4.1 is detailed in the Borrow Pits Supplementary Technical Note [REP1-011] in Section 5 and summarises the need for each borrow pit, the alternative locations that were assessed for fulfilling the specific volume deficit and the reasons the borrow pit was selected as most appropriate.

Table 4.1 Summary of borrow pits required

Borrow Pit	Purpose [1]	Alternative borrow pits considered [1]	Reason for selection [2]
E	Provide general earthworks fill material for the proposed junction 21	A, B, C, D, F, G and L	This is the closest borrow pit to the junction 21 (northbound) fill deficit area when compared to the other options. The quality and quantity of material is well suited to the purpose of the borrow pit. By using the borrow pit to supply earthworks general fill material to the embankments on the north side of the A12, traffic implications on the local road network along with the cost and carbon generation from haulage activities are minimised.

Borrow Pit	Purpose [1]	Alternative borrow pits considered [1]	Reason for selection [2]
F	Provide general earthworks fill material for the proposed junction 21	A, B, C, D, E, G and L	This borrow pit is suited to provide the junction 21 (southbound) fill area owing to its location, quality, and quantity of material available when compared to Borrow Pits D and G. Borrow Pits D and E are a closer option with potentially better material quality. However, they would require a considerable amount of local road haulage and double handling of material to provide supply to the embankments on the south side of the A12. By using Borrow Pit F to supply earthworks general fill material to the embankments on the south side of the A12, traffic implications on the local road network along with the cost and carbon generation from haulage activities can be minimised.

Borrow Pit	Purpose [1]	Alternative borrow pits considered [1]	Reason for selection [2]
I	Provide general earthworks fill material for the proposed junction 22	H and J	This borrow pit is best suited to provide the junction 22 fill area owing to its location, quality, and quantity of material available when compared to the other options. The borrow pit is located on the opposite side of the existing A12 carriageway to its intended fill location, which is not desirable, but this is alleviated by installing a temporary bridge over the existing carriageway to provide a direct off-road haul route. The cost of a temporary bridge for this borrow pit is acceptable because of the volume of fill required for the junction 22 fill embankments (being double that of junction 21). The benefits of minimising traffic implications on the local road network for this larger volume of fill material, along with the cost and carbon generation from haulage activities also contribute to the feasibility of the borrow pit and temporary bridge in this location.

Borrow Pit	Purpose [1]	Alternative borrow pits considered [1]	Reason for selection [2]
J	Provide granular engineering material for the entire project	H and K	This borrow pit is best suited to provide the proposed scheme with granular engineering fill material owing to its location, quality, and quantity of material available when compared to Borrow Pits H and K. This has been confirmed from further supplementary ground investigation information recently undertaken. The choice of a single, centrally located borrow pit to provide granular engineering material for the proposed scheme is preferred because of the costs involved in setting up multiple material processing plants to gain the required quality of material. Borrow Pit J can facilitate this in a single area involving only one set up. Especially with its relatively central location along the scheme compared to Borrow Pits H and K.
Note: 1. Information extracted from Table 5.2 of the Borrow Pits Supplementary Technical Note [REP1-011] Note 2. Information extracted from Table 5.4 of the Borrow Pits Supplementary Technical Note [REP1-011]			

4.1.2 The above summary is a culmination of a significant amount of assessment involving considerable amounts of site survey work to determine the optimum locations for borrow pits to meet the need of fill deficit areas that have been identified from the earthworks volume calculation and modelling works. The number of locations considered in this exercise ensure the assessment is robust.

4.1.3 Further to the work presented in Table 4.1, the Applicant's response to the relevant representation D4-008-003 addresses the aspect of modifying the current preferred approach of potentially deleting certain borrow pits and winning the deficit volume from the remaining ones.

Deleting Borrow Pit E

4.1.4 This would mean that the 200,000m^3 deficit at junction 21 would have to be supplied through Borrow Pit F on its own, or with the support of Borrow Pit I.

4.1.5 Using Borrow Pit F alone will require 100,000m^3 of general earthworks material to be moved by road over the existing Woodend bridge.

4.1.6 This would equate to 25,000 lorry movements over the structure, which will also completely contradict commitments made in the Outline Construction Traffic Management Plan (OCTMP) [REP4-033] to reduce construction traffic over this structure for local receptors (paragraph 2.5.1).

4.1.7 An alternative option would be to include a temporary bridge at the junction, over the existing A12 to mitigate the above impacts. A temporary bridge would not be a viable solution because this would significantly compromise the construction programme by preventing the early delivery of the J21 slip roads. These slip roads are necessary to allow construction phases to proceed at Hatfield Peverel. Extending the construction programme through this sensitive corridor to mitigate this spatial constraint is not a suitable option because of the impact on the local community of Hatfield Peverel.

4.1.8 In order to maintain the proposed scheme programme, additional work fronts (or earth moving teams) would have to be introduced into the remaining borrow pit area to ensure both junction 21 and 22 are fed material at the planned rate. For Borrow Pit F this would add spatial constraints to currently planned working arrangements (such as access and egress points), which will potentially limit the haulage rate that can be achieved.

4.1.9 Borrow Pit F also has an area sterilised by a local high-pressure gas main and buried water main which puts additional spatial constraints on managing the borrow pit operation, making working from multiple fronts very challenging, further limiting the dig depth that could be achieved beyond the current depth of 4m.

4.1.10 Attempting to meet the 100,000m^3 deficit from Borrow Pit I will also require moving this volume via the road network, over a considerably longer distance than from Borrow Pit F, and over Woodend bridge, increasing the GHG emissions and impacts to local receptors associated with the transport activity.

4.1.11 Road hauling material from borrow pits also introduces an element of double handling, which is not otherwise required. This is because borrow pit and tipping areas are generally not suitable for road-going lorries. Therefore, excavators would be required at both ends of the haulage operation to transfer the material into articulated dump trucks to manage the off-road element of haulage.

4.1.12 The combination of the volume of road lorries and additional element of doubling handling increases the cost of the direct works associated with more

plant being involved and hauling the material over a greater distance. The distance travelled from other borrow pits is much further than the off-road haul route currently planned for Borrow Pit E, which would increase the carbon generation associated with this activity.

4.1.13 Further to the above, the understanding of palaeolithic archaeology in Borrow Pit F has increased and it is now worth noting that excavating beyond the current maximum dig depth increases the risk of encountering deposits with palaeolithic potential. Further work may be required to gain a more accurate understanding of where the deposits lie before a plan for excavating deeper can be established, potentially limiting the total depth of the borrow pit, meaning that the required volumes might not be achieved.

Deleting Borrow Pit F

4.1.14 The effects of deleting Borrow Pit F are very similar to those presented above for Borrow Pit E. This would also mean that the 200,000m^3 deficit at junction 21 would have to be supplied through Borrow Pit E on its own, or with the support of Borrow Pit I.

4.1.15 All of the above points apply directly in this scenario. The only difference is that:

- if Borrow Pit I were to be used to supplement the 100,000m^3 deficit, the haul distance would be even longer still because the access point for road hauled material will have to travel via Wellington Road bridge.
- This would impact the junction 21 construction programme and traffic volume over Wellington Road bridge, again contradicting commitments made in the OCTMP [REP4-033] to reduce construction traffic over this structure.
- Borrow Pit E does not have the same spatial constraints from buried utilities that will limit its excavation depth, however this could be limited by the presence of palaeolithic archaeology.

4.1.16 As with Borrow Pit F, excavating beyond the current maximum dig depth of Borrow Pit E increases the risk of encountering deposits with palaeolithic potential.

Deleting Borrow Pit I

4.1.17 The effects of deleting Borrow Pit I are more significant than that of deleting Borrow Pits E and F, predominantly because of the volume of material required from Borrow Pit I. The 400,000m^3 deficit at junction 22 would have to be supplied through Borrow Pits E, F and possibly the overburden material from Borrow Pit J.

4.1.18 Off road haulage routes between Borrow Pits E, F and J and the proposed fill location at junction 22 are not feasible due to several physical constraints including crossing the A12, Maldon Road and the river Blackwater. Therefore, the 400,000m3 of material required for the proposed junction 22 would have to be moved by road.

4.1.19 For Borrow Pits E and F this would mean significantly increasing the volume of construction traffic that passes over the existing Woodend bridge and Wellington bridge, which would again, contradict the commitments made in the OCTMP [REP4-033]. At the other end of the haulage route, Coleman's bridge and Eastway's junction would also be impacted by the increased construction traffic, also contradicting commitments made in the OCTMP [REP4-033].

4.1.20 For the 400,000m3 that is required to be moved, this would equate to an extra 50,000 lorry movements over the structures, increasing the impacts to any receptors local to the haul route.

4.1.21 The temporary bridge allowed for at Borrow Pit I could be placed between Borrow Pits E and F to mitigate the traffic impacts to the Woodend and Wellington Road structures, however its location will compromise the construction of the proposed junction 21 as previously mentioned in 4.1.7 of this report.

4.1.22 If the 300,000m3 of Borrow Pit J overburden material were to be used to supplement the deficit at the proposed junction 22 the haulage length would change from a sub-4km off-road return journey to an approximate 27km on-road return journey.

4.1.23 This is because the only suitable turn around for road traffic to get from junction 22 back into Borrow Pit J is via junction 25. The movement of granular engineering fill material from Borrow Pit J, will be used throughout the scheme, and has been assessed as considerably lower cost and environmental impact than importing from further outside of the Order Limits. However, if the overburden from Borrow Pit J is included in the material to be moved from Borrow Pit J, then the environmental impacts are unacceptably high.

Deleting Borrow Pit J

4.1.24 Deleting Borrow Pit J will mean that all of the deficit of granular engineering material (445,000m^3) will need to be supplied from external sources, possibly with some support from Borrow Pit I. This could mean excavating more material from Borrow Pit I than previously stated, depending on the volume of granular material available within the excavated area.

4.1.25 The effects of deleting Borrow Pit J are therefore covered by the work presented in Section 3 of this report. Import from external sources is the only other alternative because Borrow Pits E and F cannot offer granular engineering material. Further work would be required to determine the feasibility of including more granular material from Borrow Pit I (due to available quantity and quality). The volume will not be enough to replace that provided for Borrow Pit J, which is why it was not considered as a granular engineering fill borrow pit in the initial assessments carried out.

4.1.26 In summary, attempting to modify the approach to meeting the proposed scheme deficit by varying the use of borrow pits from the most efficient arrangement currently planned is not feasible for the reasons set out in 3.2.4

above and including the technical challenges that prevent some borrow pits from being excavated deeper.

5 Updated borrow pits cost information

5.1 Changes to worksheets

5.1.1 The Applicant has revisited the Borrow Pits Cost Information [REP3-023] with its supply chain and has been able to make amendments to the way the information is presented to be able to reveal more information.

5.1.2 Unfortunately, one supplier has been removed from the tables because permission could not be gained to use the further revealed information on the grounds of commercial sensitivity.

5.1.3 This has changed the average supplier rates provided in the bottom line of both worksheets, which were presented in previous reports. However, the change is minor, in the order of £1-2 per cubic metre, which does not change any of the conclusions drawn in previous reports.

5.1.4 The re-presented cost information has been submitted to provide further clarity on what factors constitute the final cost rates for each option (see the bottom line of the worksheets) and which factors are driving those final costs.

5.1.5 The revised cost worksheets are included within Appendix A – Revised Table 4.3 General Fill Material Import Rates Worksheet and Appendix B – Revised Table 4.4 Engineering Fill Material Import Rates Worksheet.

5.2 Analysis of worksheets

5.2.1 As previously explained in the Borrow Pits Cost Information [REP3-023], the cost development exercise follows an order of magnitude approach which provides a suitable basis for estimating project costs in early development phases.

5.2.2 All options have included aspects of indirect works costs such as:

- Preliminary project costs and temporary works
- A range of direct works which predominantly includes procuring/winning/processing the deficit earthworks material and placing it where it needs to go.
- The contractor's construction cost risks associated with the value of the direct works.
- Costs associated with procuring the land to undertake the works and protecting existing utilities within the borrow pit area.
- A contingency cost allowance that represents the level of portfolio risk which is carried by the Applicant against their scheme budget.

This demonstrates that the full cost of each option has been valued to provide a robust assessment that is directly comparable against each option.

Specific details of the composition of each cost element is included within the 'comments' columns of each worksheet.

5.2.3 The construction cost is the largest portion of the final cost for each option. Most of the other indirect cost items are driven by this value. Therefore this element is generally what drives the final cost rate for each option.

5.2.4 The construction costs for the borrow pits option is the lowest of the three options explored. This is despite the inclusion of the cost aspects of procuring the land for borrow pits, stripping off topsoil and any overburden, carrying out archaeological mitigation works and attending to any landscaping/ecological works required. These elements of direct works are not required (or included) when importing material from external sources.

5.2.5 This demonstrates that excavating the material required from borrow pits within the Order Limits is more cost effective, which is logical when consideration is given to the fact that imported material from external suppliers will have to undertake the same activities and that the material must travel a much further distance on less efficient haulage machinery before it is placed in an embankment. The supplier rate will also include a profit margin, which is not a cost that is borne by using borrow pits.

5.2.6 The high cost of importing externally sourced material is also driven by the increased cost in handling and placing the material which is driven by inefficiencies in extra machinery required for double handling and underutilised placement and compaction resources.

5.2.7 The option of using borrow pits also includes the value of the opportunity of depositing unsuitable material back into the borrow pits as part of their restoration. This value is not representative of the cost of undertaking the activity, but represents the benefit gained in being able to do so for this option. This opportunity is not realised in the other options because the material will have to be exported from site, possibly to landfill.

5.2.8 The preliminaries and other overhead costs are a function of the construction related costs, based on historical information from schemes of a similar size and nature. This is the next largest portion of the final cost for each option and represents aspects such as the amount of time and management resource required with delivering the options.

5.2.9 As previously explained in the Borrow Pits Supplementary Technical Note [REP1-011] Section 4, the import of materials from external sources is significantly slower than using borrow pits predominantly due to site access and egress constraints, availability of transport and other external market factors meaning it takes longer to achieve the total volume of import, which drives up the cost.

5.2.10 At the bottom of the worksheet a contingency percentage has been applied to the total cost of the activity, representing the level of portfolio risk which is carried by the Applicant against their scheme budget. A low percentage contingency is representative of a well-developed plan that carries a good level of certainty on achieving the budgeted outcome. A high percentage contingency

represents the contrary (potential scheme cost overrun) and is driven by the level of uncertainties included within the plan that is progressed.

5.2.11 The external import options carry a high percentage contingency when compared to the borrow pits option because the material sources are subject to variations in the market, such as local demand, and cannot be guaranteed to be available in the quantity and quality required at the appropriate time.

6 Conclusion

6.1.1 It is necessary to include borrow pits within the Order Limits of the proposed scheme because:

- They secure the quantity and quality of material required to meet the proposed scheme need ensuring it is available exactly when required.
- Borrow pits are the least impactful option in environmental aspects relating to the transport of the volume of deficit material and the mitigation of construction impacts can be suitably controlled.
- Borrow pits are the most cost effective and efficient solution to meeting the proposed scheme's earthworks volume deficit ensuring the programme and budget can be achieved.
- Borrow pits have reduced road traffic and health and safety risks
- Similarly, the borrow pits are not subject to the vagaries of external market factors that can have significant impacts on the delivery of proposed scheme earthworks affecting the programme duration and overall cost of the scheme.

6.1.2 Considering the above information, attempting to 'blend' the approach for winning earthworks deficit material (or use one of the alternative options for that matter) will unnecessarily increase the environmental impact on local receptors because of the affect it will have on construction traffic volumes.

6.1.3 If the blended approach is adopted the deficit material required will need to be driven on the road network in lorries that will have to travel longer distances to complete the journey. The limited size of the lorries (typically $8m^3$ for a road lorry vs $16m^3$ for a 40 tonne articulated dumper truck) and the distance they need to travel will mean that significant numbers of lorries will be required every day to move the earthworks material to attempt to maintain an efficient earthworks operation. This will mean that the peak construction traffic and environmental impacts associated with large scale import from external sources may be experienced over a longer period, bringing unnecessary detriment to the local receptors.

6.1.4 Furthermore an increasing reliance on road import from external sources will:

- Increase construction risks to the project, through reduced certainty (in sourcing and quality of material, plus the import rate achieved), which may lead to an increased import duration that would need to be mitigated through inefficient working (such as through winter).
- Cause a necessity to rely on higher grade materials to ensure the project remains on programme, which is both a costly and inappropriate use of such materials.
- Increase the temporary works elements required to facilitate a different earthworks strategy, of increasing the number of work fronts and using

road-going vehicles. As stated in the Borrow Pits Supplementary Technical Note [REP1-011], this could include more and longer aggregate built haul roads and more construction plant to double/treble-handle the imported material.

- Increase the safety hazards associated with the earthworks operations, including the logistics of merging the construction traffic with the local and strategic road network traffic.

6.1.5 For these reasons borrow pits are critical to the effective and efficient delivery of the proposed scheme.

Appendix A - Table 4.3 General Fill Material Import Rates Worksheet Rev1

Table 4.3 General Fill Material Import Rates Worksheet

WBS	Item	Bill of Quantities: Bill Description	Unit	Quantity	Borrow Pit Q1 2023: Rate Q1 2023	Borrow Pit Q1 2023: Amount Q1 2023	Supplier Q1 2023: Rate Q1 2023	Supplier Q1 2023: Amount Q1 2023	Supplier Q1 2023: Rate Q1 2023	Supplier Q1 2023: Amount Q1 2023	Other Project Q1 2023: Rate Q1 2023	Other Project Q1 2023: Amount Q1 2023	Comments
		CONSTRUCTION COSTS - INDIRECT WORKS											
		PRELIMINARY COSTS											
	100.01	Preliminaries and Other Overhead Costs	sum	1.00	£ 2,845,000.00	£ 2,845,000.00	£ 10,979,258.36	£ 10,979,258.36	£ 6,102,475.40	£ 6,102,475.40	£ 6,630,757.55	£ 6,630,757.55	Cost developed by applying historical percentages of InDirect Works costs to the Direct Works total cost. Preliminary costs may include, but re not limited to Construction Management, Attendant Labour & Plant, Site Accommodation, Health, Safety and Environmental Management, IT & Systems, Site Security, Provision of Power, Water and Waste Management.
		TEMPORARY WORKS COSTS											
	100.02	Temp Bridge - BP I	sum	1.00	£ 1,540,000.00	£ 1,540,000.00							Cost developed to install, hire, remove and reinstate for temporary bridge structure to Borrow Pit I
	100.03	Dewatering - BP E	sum	1.00	£ 165,000.00	£ 165,000.00							Cost developed to dewater Borrow Pit operation.
	100.04	Dewatering - BP F	sum	1.00	£ 220,000.00	£ 220,000.00							Cost developed to dewater Borrow Pit operation.
	100.05	Dewatering - BP I	sum	1.00	£ 770,000.00	£ 770,000.00							Cost developed to dewater Borrow Pit operation.
	100.06	Other Temporary Works	sum	1.00	£ 550,000.00	£ 550,000.00							Cost developed to account for other significant temporary works in order to facilitate Borrow Pit Operations. E.g. haul roads, fencing, highway access/egress
					Sub-Total	£ 6,090,000.00	Sub-Total	£ 10,979,258.36	Sub-Total	£ 6,102,475.40	Sub-Total	£ 6,630,757.55	
		CONSTRUCTION COSTS - DIRECT WORKS											
		ACCEPTABLE FILL MATERIAL											
	600.01	Imported acceptable material in embankments and other areas of fill including environmental bunds	m3	600,000	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Excavation of Class 1/2 from BP **Supplier Rate -** Import of Class 1/2 from Off Site **Other Project -** Excavation of Class 1/2 from 'Other Project' Stock Pile & Haul 40km via 20T Tipper to Site
	600.02	Deposition of acceptable material in embankments and other areas of fill	m3	600,000	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Amalgamated onsite and offsite haulage rates from the Borrow Pits to the point of placement including deposition of material. **Supplier Rate -** Deposition of material at the point of placement. **Other Project -** Deposition of material at the point of placement.
	600.03	Double Handling	m3	300,000			£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Sourcing of material directly from the Borrow Pit eliminates double handling. **Supplier Rate -** Excavation from stock pile and onsite haulage to permanent deposition. **Other Project -** Excavation from stock pile and onsite haulage to permanent deposition.
	600.04	Compaction of acceptable material in embankments and other areas of fill	m3	600,000	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Compaction of Class 1/2 as deposited. **Supplier Rate -** Compaction of Class 1/2 as deposited. **Other Project -** Compaction of Class 1/2 as deposited.
		METHOD RELATED DIRECT WORKS											
	600.05	Topsoil strip - BP E	m3	43,194	£ 15.62	£ 674,763.90							**Borrow Pit Rate -** Excavation and haulage to temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required. **Other Project -** Not required.
	600.06	Topsoil strip - BP F	m3	39,122	£ 15.62	£ 611,152.32							**Borrow Pit Rate -** Excavation and haulage to temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required. **Other Project -** Not required.
	600.07	Topsoil strip - BP I	m3	42,496	£ 15.62	£ 663,859.96							**Borrow Pit Rate -** Excavation and haulage to temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required. **Other Project -** Not required.
	600.08	Re-soil Bps - BP E	m3	19,359	£ 15.62	£ 302,420.58							**Borrow Pit Rate -** Excavation and haulage from temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required. **Other Project -** Not required.
	600.09	Re-soil Bps - BP F	m3	20,133	£ 15.62	£ 314,511.78							**Borrow Pit Rate -** Excavation and haulage from temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required. **Other Project -** Not required.
	600.10	Re-soil Bps - BP I	m3	19,431	£ 15.62	£ 303,545.34							**Borrow Pit Rate -** Excavation and haulage from temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required. **Other Project -** Not required.
		AGGREGATE LEVY											
	600.11	Aggregate Levy	m3	120,000	£ 4.00	£ 480,000.00							**Borrow Pit Rate -** Applied the Aggregate Levy rate (£2 per ton) to estimated volume of Class 1 material only. **Supplier Rate -** Rates above include Aggregate Levy. **Other Project -** Rates above include Aggregate Levy.
		ARCHAEOLOGY											
	3001.01	Archaeology Mitigation - BP E	sum	-	£ -	£ -							**Borrow Pit Rate -** Cost to complete the Archaeology Investigation and Mitigation. **Supplier Rate -** Not required. **Other Project -** Not required.
	3001.02	Archaeology Mitigation - BP F	sum	1.00	£ 490,000.00	£ 490,000.00							**Borrow Pit Rate -** Cost to complete the Archaeology Investigation and Mitigation. **Supplier Rate -** Not required. **Other Project -** Not required.
	3001.03	Archaeology Mitigation - BP I	sum	1.00	£ 320,000.00	£ 320,000.00							**Borrow Pit Rate -** Cost to complete the Archaeology Investigation and Mitigation. **Supplier Rate -** Not required. **Other Project -** Not required.
		LANDSCAPING & ECOLOGY											
	3000.01	Landscaping and ecology	sum	1.00	£ 550,000.00	£ 550,000.00							**Borrow Pit Rate -** Cost to complete the Landscaping & Ecology Investigation and Mitigation. **Supplier Rate -** Not required. **Other Project -** Not required.
					Sub-Total	£ 8,759,524.05	Sub-Total	£ 33,800,000.26	Sub-Total	£ 18,786,666.93	Sub-Total	£ 20,413,000.53	
		CONSTRUCTION COSTS - RISK, OPPORTUNITY, OVERHEADS & FEE											
	R1.01	**Risk** Contractors Risk Allowance	%	10.00%	£ 14,849,524.05	£ 1,484,952.41	£ 44,779,258.63	£ 4,477,925.86	£ 24,889,142.33	£ 2,488,914.23	£ 27,043,758.08	£ 2,704,375.81	Cost developed by applying historical risk percentages to the Total InDirect & Direct Works cost.
	O1.01	**Opportunity** Contractors Opportunity Allowance	%	0.00%	-£ 2,500,000.00	-£ 2,500,000.00							**Borrow Pit Rate -** Opportunity to dispose of unsuitable material as backfill to Borrow Pits. **Supplier Rate -** Excluded. **Other Project -** Excluded.
	F1.01	**Fee** Contractors Fee	%			Excluded		Excluded		Excluded		Excluded	Excluded
		TOTAL CONSTRUCTION COSTS				£ 13,834,476.46		£ 49,257,184.49		£ 27,378,056.56		£ 29,748,133.88	
		Schedule of Other Costs											
	SoOC.01	Schedule of Other Costs	sum	1.00	£ 2,948,000.00	£ 2,948,000.00							**Borrow Pit Rate -** Estimated Client costs. E.g. Lands, Statutory Undertakers **Supplier Rate -** Excluded. **Other Project -** Excluded.
		TOTAL ADJUSTMENT COSTS											
	CON1.01	**Contingency** Contingency	%	5.00%	£ 16,782,476.46	£ 839,123.82	10.00% £ 49,257,184.49	£ 4,925,718.45	10.00% £ 27,378,056.56	£ 2,737,805.66	15.00% £ 29,748,133.88	£ 4,462,220.08	**Borrow Pit Rate –** Based on a mature earthworks strategy to meet the projects programme and cost requirements. **Supplier Rate –** Based on Market Engagement. **Other Project –** Based on the availability of material and potential to synchronise schedule with a local project.
		GRAND TOTAL COSTS				£ 17,621,600.28		£ 54,182,902.94		£ 30,115,862.22		£ 34,210,353.97	
		Total Cost per m3 of Class 1/2	m3			£ 29.37		£ 90.30		£ 50.19		£ 57.02	

Average Supplier Rate £70.25

Appendix B - Table 4.4 Engineering Fill Material Import Rates Worksheet Rev1

Table 4.4 Engineering Fill Material Import Rates Worksheet

WBS	Item	Bill of Quantities Bill description	Unit	Quantity	Borrow Pit Q1 2023 Rate Q1 2023	 Amount Q1 2023	Supplier [redacted] Q1 2023 Rate Q1 2023	 Amount Q1 2023	Supplier [redacted] Q1 2023 Rate Q1 2023	 Amount Q1 2023	Comments
		CONSTRUCTION COSTS - INDIRECT WORKS									
		PRELIMINARY COSTS									
	100.01	Preliminaries and Other Overhead Costs	sum	1.00	£ 5,103,000.00	£ 5,103,000.00	£ 6,806,480.30	£ 6,806,480.30	£ 6,865,444.26	£ 6,865,444.26	Cost developed by applying historical percentages of InDirect Works costs to the Direct Works total cost. Preliminary costs may include, but re not limited to Construction Management, Attendant Labour & Plant, Site Accommodation, Health, Safety and Environmental Management, IT & Systems, Site Security, Provision of Power, Water and Waste Management.
		TEMPORARY WORKS									
	100.02	Dewatering - BP J	sum	1.00	£ 649,000.00	£ 649,000.00					Cost developed to dewater Borrow Pit operation.
	100.03	Other Temporary Works	sum	1.00	£ 110,000.00	£ 110,000.00					Cost developed to account for other significant temporary works in order to facilitate Borrow Pit Operations. E.g. haul roads, fencing, highway access/egress
					Sub-Total	**£ 5,862,000.00**	**Sub-Total**	**£ 6,806,480.30**	**Sub-Total**	**£ 6,865,444.26**	
		CONSTRUCTION COSTS - DIRECT WORKS									
		ACCEPTABLE FILL MATERIAL									
	600.01	Imported acceptable class 6 material	m3	300,000	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Excavation and haul to Stockpile of Class 6 from BP **Supplier Rate -** Import of Class 6 from Off Site
	600.02	Processing - Mobilisation	sum	1.00	£ 2,805,263.16	£ 2,805,263.16					**Borrow Pit Rate -** Cost to establish, operate and demobilise onsite processing facility. **Supplier Rate -** Not required
	600.03	Deposition of acceptable material in embankments and other areas of fill	m3	300,000	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Amalgamated onsite and offsite haulage rates from the Borrow Pits to the point of placement including deposition of material. **Supplier Rate -** Deposition of material at the point of placement.
	600.04	Double Handling	m3	60,000	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Excavation from stock pile and onsite haulage to permanent deposition. **Supplier Rate -** Excavation from stock pile and onsite haulage to permanent deposition.
	600.05	Compaction of acceptable material in embankments and other areas of fill	m3	300,000	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	£ [redacted]	**Borrow Pit Rate -** Compaction of Class 6 as deposited. **Supplier Rate -** Compaction of Class 6 as deposited.
		METHOD RELATED DIRECT WORKS									
	600.06	Topsoil strip - BP J	m3	68,400	£ 18.22	£ 1,246,467.78					**Borrow Pit Rate -** Excavation and haulage to temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required.
	600.07	Re-soil Bps - BP J	m3	41,904	£ 18.22	£ 763,625.52					**Borrow Pit Rate -** Excavation and haulage from temporary stockpile of Topsoil. Including Subcontractor preliminary costs. **Supplier Rate -** Not required.
		AGGREGATE LEVY									
	600.08	Aggregate Levy	m3	300,000	£ 4.40	£ 1,320,000.00					**Borrow Pit Rate -** Applied the Aggregate Levy rate (£2 per ton) to estimated volume of Class 6 material. **Supplier Rate -** Rates above include Aggregate Levy.
		ARCHAEOLOGY									
	3001.01	Archaeology Mitigation - BP J	sum	1.00	£ 1,650,000.00	£ 1,650,000.00					**Borrow Pit Rate -** Cost to complete the Archaeology Investigation and Mitigation. **Supplier Rate -** Not required.
		LANDSCAPING & ECOLOGY									
	3000.02	Landscaping and ecology	sum	1.00	£ 198,000.00	£ 198,000.00					**Borrow Pit Rate -** Cost to complete the Landscaping & Ecology Investigation and Mitigation. **Supplier Rate -** Not required.
					Sub-Total	**£ 15,709,820.86**	**Sub-Total**	**£ 20,951,377.90**	**Sub-Total**	**£ 21,132,877.90**	
		CONSTRUCTION COSTS - RISK, OPPORTUNITY, OVERHEADS & FEE									
		Risk									
	R1.01	Contractors Risk Allowance (10% of Construction Costs)	%	10.00%	£ 21,571,821	£ 2,157,182.09	£ 27,757,858	£ 2,775,785.82	£ 27,998,322	£ 2,799,832.22	Cost developed by applying historical risk percentages to the Total InDirect & Direct Works cost.
		Opportunity									
	O1.01	Contractors Opportunity Allowance	%	0.00%		Excluded		Excluded		Excluded	Excluded
		Fee									
	F1.01	Contractors Fee	%	0.00%		Excluded		Excluded		Excluded	Excluded
		TOTAL CONSTRUCTION COSTS (Direct + Indirect Costs + Risk)				**£ 23,729,002.95**		**£ 30,533,644.02**		**£ 30,798,154.38**	
		Schedule of Other Costs									
	SoOC.01	Schedule of Other Costs	sum	1.00	£ 1,540,000.00	£ 1,540,000.00					**Borrow Pit Rate -** Estimated Client costs. E.g. Lands, Statutory Undertakers **Supplier Rate -** Excluded.
		TOTAL ADJUSTMENT COSTS									
	CON1.01	**Contingency** Contingency	%	5.00%	£ 25,269,002.95	£ 1,263,450.15	10.00% £ 30,533,644.02	£ 3,053,364.40	10.00% £ 30,798,154.38	£ 3,079,815.44	**Borrow Pit Rate –** Based on a mature earthworks strategy to meet the projects programme and cost requirements. **Supplier Rate –** Based on Market Engagement.
		GRAND TOTAL COSTS				**£ 26,532,453.09**		**£ 33,587,008.43**		**£ 33,877,969.82**	
		Total Cost per m3 of Class 6	m3			£ 88.44		£ 111.96		£ 112.93	

Average Supplier Rate £112.44