15 Materials

15.1 Introduction

15.1.1 This Chapter provides an assessment of the likely significance of environmental effects from the use of material resources needed to raise the site levels for the proposed development.

15.1.2 Material resources, in the context of this chapter, can be defined as tangible and useful assets. They include both primary raw materials, such as aggregates and minerals, and secondary manufactured products, like concrete. The majority of material resources would originate off-site and some, such as excavated soils, would arise on-site.

15.1.3 The production, sourcing, transport, handling, storage and use of these materials has the potential to adversely affect the environment. The key impacts associated with the storage, use and consumption of materials, in relation to the site levelling required for the proposed development, are addressed later in this chapter. Impacts that relate to the transportation of materials is not covered in this chapter but is considered within Chapter 4 (Traffic and Transport).

15.1.4 The use of material resources for the site levelling has been estimated, as set out in Table 15.7, based on the likely requirements of the design as described in Chapter 3: proposed development.

15.1.5 The assessment focuses on the construction phase of the proposed development where there is the potential for significant effects to occur in relation to on-site and off-site material resources. Operational impacts will not be considered as the impacts are dependent on, and will be controlled by, the long-term maintenance regime of the proposed development. Periodic inspections and maintenance would be required but this is not anticipated to have significant resource demands. This can therefore be scoped out of the assessment.

15.1.6 The assessment has been conducted in accordance with the guidance set out in the Design Manual for Roads and Bridges (DMRB) Guidance LA 110: "Material Assets and Waste"[1] as, although the proposed development is not a road scheme, this guidance is treated as best practice in the absence of any more relevant sector-specific guidance, at the time of writing.

15.1.7 The assessment of environmental effects, associated with the use of material resources resulting from the construction of the proposed development, has taken the following into account:

- the works area (within the proposed development's redline boundary);
- the cut and fill balance;

[1] http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/LA%20110%20Material%20assets%20and%20waste-web.pdf

- the material sources (both on and off-site material resources required by the proposed development);
- the storage of materials during construction; and
- the processing of materials.

15.1.8 It is outside the scope of the assessment, as defined in the LA 110 guidelines, to assess the environmental impacts associated with the extraction of raw materials and the manufacture of products which occurs off-site. The guidance recognises that these stages of a material's life cycle are likely to have already been subjected to an environmental assessment. Instead this chapter focusses on the assessment of the impacts and effects that will occur as a result of the use of primary, secondary and recycled raw materials and secondary manufactured construction products on the proposed development.

15.2 Review of proposed development

15.2.1 The site of the proposed development sits on the edge of the Gwent Levels, marking the transition between the expansive flat lowland areas to the south and east, and the undulating topography of St Mellons to the east and north. The site is largely flat with small localised level changes associated with reens, field ditches, and hedgerows. A topographical survey shows a range in ground level between 4.7m and 6.3m AOD (see Chapter 3: Proposed Development for more information).

15.2.2 Access roads, buildings and public realm areas would be placed on a raised plateau which would raise site levels to 6m AOD and above, so as to comply with TAN 15 regulations regarding flood protection.

15.2.3 The proposed development includes widening of the railway embankment and construction of a station building and associated infrastructure.

15.2.4 Materials for site levelling would be brought to site on trucks which would utilise the local (Cypress Drive and road bounding the site perimeter) and regional (A48(M) and M4) road network to reach the site.

15.2.5 This chapter will focus purely on the materials required to raise the site levels of the proposed development. All other elements of the proposed development have been scoped out of the chapter for the reasons detailed in 15.4.2.

15.3 Legislation, policy context and guidance

Legislation

EU Waste Framework Directive 2008/98/EC

15.3.1 The overarching policy in relation to the handling of material resources for the proposed development is the EU Waste Framework Directive 2008/98/EC. This provides the framework legislation for the collection, transport, recovery and disposal of waste. It includes a common definition of 'waste', which is 'any substance or object which the holder discards or intends or is required to discard', with the term 'discard' including the disposal, recovery or recycling of a substance.

15.3.2 The overall purpose of the Waste Framework Directive is to set out measures to protect the environment and human health by preventing or reducing effects of waste generation and its management, and by improving the efficiency of resource use. Where waste is unavoidable the Waste Hierarchy (Figure 1) sets out how materials, subject to regulatory controls, should be used again for the same, or different, purpose. If not possible, resources should be recycled or value can also be gained through generating energy from waste but only if the other solutions are impossible.

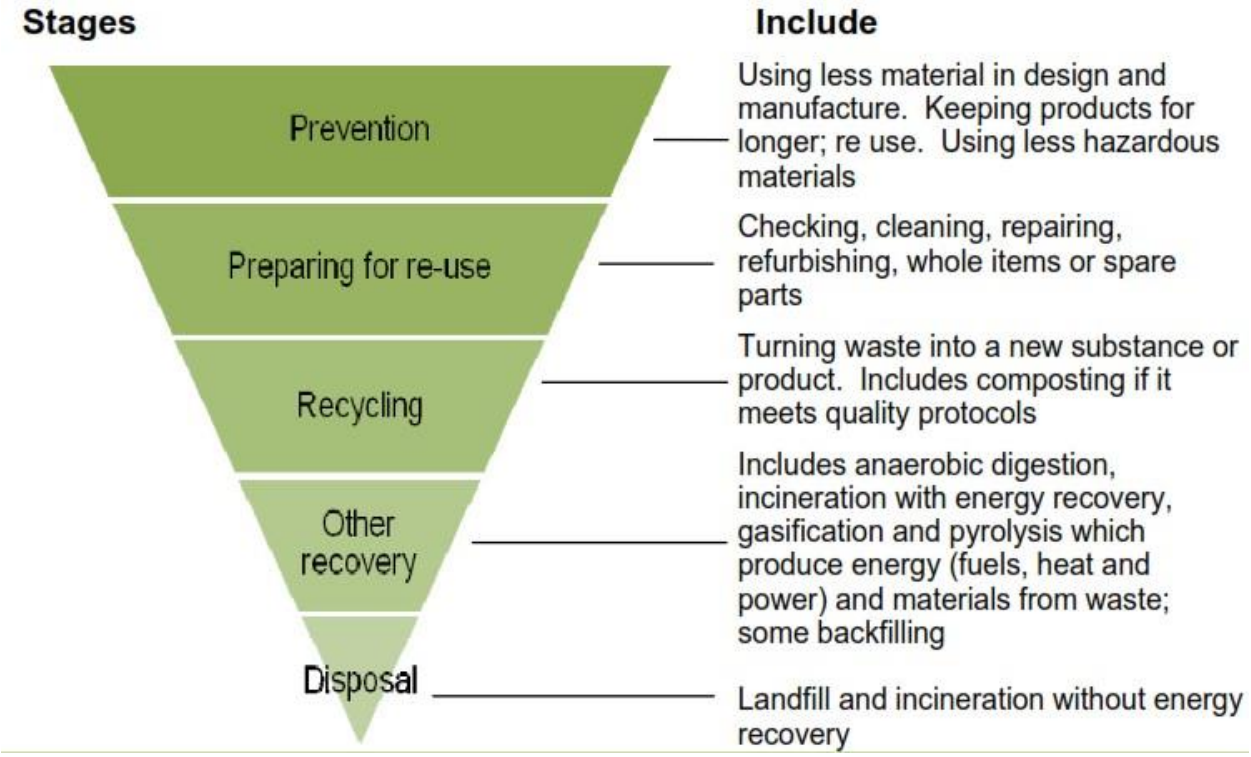

Figure 1 The Waste Hierarchy

15.3.3 The Directive sets a number of high-level objectives; including, Article 11 which requires Member States to achieve 70% recycling of non-hazardous construction and demolition waste by 2020.

The Waste (England and Wales) Regulations (2011)

15.3.4 Directive 2008/98/EC has now been transposed in Wales by the Waste (England and Wales) Regulations 2011 (S.I. 2011 No. 988).

15.3.5 In Wales, the Regulations are supplemented by the Waste (Miscellaneous Provisions) (Wales) Regulations 2011 (S.I. 2011 No. 971 (W.141)). In addition to the above, reference has been made to the following legislation relating to material resources and waste management:

- The Controlled Waste (England and Wales) Regulations 2012 which classify waste as household, industrial or commercial and determine the meaning of 'controlled waste'.
- The Hazardous Waste (England and Wales) Regulations 2005 which determine the control and monitoring of the movement of hazardous waste in order to implement the Hazardous Waste Directive (Directive 91/689/EC).

The Well-being of Future Generations (Wales) Act (2015)

15.3.6 The Well-being of Future Generations (Wales) Act (2015) aims to improve the social, economic, environmental and cultural well-being of Wales. In reference to material resource use, the Act encourages consideration of the sustainable use of materials today, in order to ensure their continued availability for future generations (Part 2, Article 5).

Environment (Wales) Act 2016

15.3.7 The Environment (Wales) Act 2016 includes three key parts that will ensure that managing natural resources sustainably will be a core consideration in decision-making. Part 1: *Sustainable Management of Natural Resources* provides modern legislation for managing Wales' natural resources to help tackle current challenges and focus on the opportunities that material resources provide.

Policy context

National planning policy

Planning Policy Wales (Edition 10) (2018)

15.3.8 Planning Policy Wales (PPW) presents the Welsh Government's land use policy, which should be taken into account when preparing development plans. The policy sets out the Welsh Government's objectives in terms of waste management. The policy states that choices about material use should be made based on the

most appropriate and sustainable use of finite resources and the promotion of the principles of the circular economy.

15.3.9 Designing out waste from projects is stated as a key method by which to achieve this. Further to this, PPW states that renewable resources, including sustainable materials (recycled and renewable materials and those with a lower embodied energy), alternatives and those which have been locally sourced should be designed in (PPW Section 5.12). It also details the need for sustainable waste management facilities in relation to the social, economic and environmental benefits and issues which can arise from granting planning permission (PPW Section 5.13).

The State of Natural Resources Report 2016

15.3.10 The State of Natural Resources Report[2] assesses if resources in Wales are being sustainably managed and supports a proactive approach for building resilience, as well as linking the sustainable management of resources to the well-being of the people of Wales (as per the Well-being of Future Generations Act 2015).

Towards Zero Waste, One Wales: One Planet 2010 (2010)

15.3.11 Towards Zero Waste (TZW) was published in 2010 and is the overarching waste strategy document for Wales. TZW sets out at a high-level strategy for how Welsh Government will manage waste in Wales to produce benefits not only for the environment, but also for the economy and social well-being. The strategy and its associated sector plans outline the actions Wales must take to reach the ambition of becoming a high recycling nation by 2025 and a zero-waste nation by 2050. Achieving the aims in TWZ relies on a suite of waste sector plans. These provide details on how the outcomes, targets and policies in TWZ are to be implemented.

Welsh Government Construction and Demolition Sector Plan (2012)

15.3.12 This Plan details outcomes, policies and actions on waste for organisations, companies and individuals in Construction and Demolition (C&D) in Wales.

15.3.13 The Plan supports Welsh Government's Towards Zero Waste Strategy which – as set out above, identifies how waste will be managed in Wales until 2050. The Plan is one of a suite of sector plans and provides further detail on the outcomes,

[2] https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en

policies and actions on waste for organisations, companies and individuals in the C&D sector in Wales.

15.3.14 The Plan provides information following an analysis of the current situation of construction and demolition waste management and sets out objectives and outcomes to be completed by 2025.

15.3.15 One of the overarching actions described in the Plan is to encourage "clients, designers and contractors to think and plan to prevent, minimise and recycle waste on C&D projects through the introduction of Material Management Plans".

WRAP Cymru Delivery Plan: 2011-15 - For a World Without Waste

15.3.16 This Plan focuses on minimising resource use and diverting priority materials from landfill. The Plan is divided into two themes: waste prevention and resource minimisation (including reuse) and recycling and recovery (including preparation for reuse).

Local planning policy

Cardiff Council

15.3.17 The Cardiff Council Local Development Plan[3] sets out the mineral resources in the region and the current, and predicted, demands upon them. It recognises that the area is an important regional provider of minerals and that their exploitation makes a significant contribution to the area's economic prosperity and standard of living. It supports the increased use of non-virgin mineral alternatives to conserve the finite mineral resources for future generations but, as there will be a continued need for some virgin mineral resources, the areas containing them must be protected from inappropriate development.

Newport Council

15.3.18 The Newport Local Development Plan[4] states that there is no current landbank[5] within the authority area, though it does have sand and gravel wharves. Agreements are in place with adjoining authorities to supply the Newport area with land-won minerals from cross-boundary locations. The Plan also states that developments should, where possible, use secondary and recycled aggregates as part of the construction process which, where possible, should be done without taking materials off-site but instead processing and reusing materials on site.

Relevant guidance

15.3.19 The assessment of the environmental effects associated with the use of material resources resulting from the construction of the proposed development has been

[3] https://www.cardiff.gov.uk/ENG/resident/Planning/Local-Development-Plan/Documents/Final%20Adopted%20Local%20Development%20Plan%20English.pdf
[4] http://www.newport.gov.uk/documents/Planning-Documents/LDP-2011-2026/LDP-Adopted-Plan-January-2015.pdf
[5] All mineral sites within the Local Authority Area with planning permission to be exploited, regardless of whether they are currently in production.

undertaken in accordance with the guidance provided within Design Manual for Roads and Bridges (DMRB) LA 110. Though this guidance refers specifically to road schemes, in the absence of alternative relevant guidance, LA 110 is held up as an example of best practice guidelines.

15.4 Scoping and consultation

Scoping

15.4.1 A request for a scoping opinion was submitted to Cardiff Council (CC) Planning Department on 5th July 2018. This request also formally informed CC that an Environmental Statement (ES) would be submitted along with the planning application for Cardiff Hendre Lakes. A scoping opinion was subsequently adopted on 25th September 2018. The Hendre Lakes Scoping Report did not scope in materials, thereby excluding a waste and materials assessment from the ES.

15.4.2 However, it was decided that in line with best practice and due to the large volume of aggregate required to level the proposed development site a materials assessment would be undertaken with a specific focus on this aggregate, as part of the planning application, following the assessment guidelines set out by LA 110. The assessment considers only those materials associated with the site levels. An assessment of the materials required for the station and buildings has not been included because the materials required for these sections will be standard building material with an established supply chain and the environmental impacts would therefore not be significant. This is consistent with the scoping opinion and an approach agreed by CPDL. The following factors will therefore be assessed for the materials required for the site levels only:

- Types and quantities of materials required to level the site, including primary, secondary and recycled materials;
- Identification and capacity of any planned material supply/recycling facilities to be utilised by the proposed development during site levelling;
- Information on any known sustainability credentials of materials to be consumed;
- The cut and fill balance; and
- Details of on-site storage and stockpiling arrangements, and any supporting logistical details.

15.4.3 Impacts of importing materials to site on the local road network, including traffic movements, carbon, air quality and noise, are considered in other chapters of this ES and are therefore not covered in this assessment.

Consultation

15.4.4 This topic was previously scoped out in the Scoping Report and was therefore not consulted on. No consultees raised materials as an area requiring assessment.

15.5 Methodology

Overview

15.5.1 This section sets out the methods used to undertake the material resources assessment, with reference to published standards, guidelines and best practice.

15.5.2 The assessment of the environmental effects associated with the use of material resources resulting from the construction of the proposed development has been undertaken in accordance with the guidance provided within DMRB LA 110.

15.5.3 There will not be a significant change in the current baseline conditions of the site between the submission of this ES and the commencement of construction of the proposed development. The site is currently used for agricultural fields with no plans, other than the proposed development, for change.

Methodology for establishing baseline conditions

15.5.4 The existing baseline conditions for material resources have been identified as the receptors which have the potential to be impacted by the proposed development. This includes the source of materials required for construction.

15.5.5 The study area comprises two geographically different areas for the purposes of this assessment.

15.5.6 The first is the anticipated maximum physical extent of the proposed development as defined in ES Chapter 1: Introduction. This is the area within which construction materials would be consumed for site levelling.

15.5.7 The second area incorporates the locations of feasible sources and availability of construction materials. The area considered was South Wales as this is the area local to the proposed development. This also includes the associated transportation networks which are likely to be used to transport the materials (refer to ES Chapter 4: Transport).

15.5.8 It is outside the scope of the guidance, as set out as best practice in LA 110, to assess the indirect environmental effects associated with the extraction of raw materials from their original source, their supplier source and the manufacture of products which occur off-site. This stage of a material's life cycle is likely to have already been subjected to an environmental assessment. These effects are therefore not addressed in this chapter. It is also outside the scope of this chapter

to undertake an assessment of greenhouse gas emissions associated with the use and transportation of materials (refer to Chapter 14: Climate Change).

15.5.9 The baseline conditions have been informed by desk-based studies and information from ground investigations, including (but not limited to):

- Ground investigations associated with the proposed development[6];
- Aggregates Safeguarding and Mineral Resources Map for Cardiff in the Local Development Plan[7];
- Mineral Background Paper in Newport Local Development Plan[8];
- BGS Aggregates Safeguarding and Mineral Resources Map[9];
- Local Development Plan for Cardiff[10];
- Local Development Plan for Newport[11]; and
- Local development policies and topic papers.

Assessment methodology

Methodology for assessment of effects from construction

15.5.10 In accordance with LA 110, this assessment examines the assembly of data and information, that is readily available, to address potential effects. The assessment concludes with an understanding of the likely environmental effects, on the material resources and sources, in order to inform the final design.

15.5.11 The results of this assessment are detailed in this chapter and identify the following:

- The materials and associated quantities; and
- The impacts that will arise, (based on the methodology set out in the LA 110) as a result of the requirement for large volumes of material to level and raise the site for the proposed development.

Significance criteria

15.5.12 The DMRB LA 104[12] Advice Note has been used to inform the significance criteria for the proposed development.

15.5.13 There are three stages to the assessment. The first stage is an evaluation of the value (sensitivity) of the material resource based on an assessment of the quality,

[6] See Chapter 6: Ground Conditions
[7] http://ishare.cardiff.gov.uk/mycardiff.aspx?ms=Cardiff_Live/
[8] http://www.newport.gov.uk/documents/Planning-Documents/LDP-2011-2026/Minerals-background-paper-June-2012.pdf
[9] https://www.bgs.ac.uk/mineralsuk/maps/maps.html
[10] https://www.cardiff.gov.uk/ENG/resident/Planning/Local-Development-Plan/Documents/Final%20Adopted%20Local%20Development%20Plan%20English.pdf
[11] http://www.newport.gov.uk/en/Planning-Housing/Planning/Planning-policy/Local-Development-Plan/Local-Development-Plan.aspx
[12] https://www.standardsforhighways.co.uk/dmrb/search?q=la%20104&pageNumber=1

scale, rarity and the services provided. This value is based on the descriptions cited in Table 15.1 which are taken from Table 3.2N of LA 104.

15.5.14 The value of the material resource is dependent on its capacity to provide material resources; i.e. the landbank volume of existing crushed rock supplies.

Table 15.1 Environmental Value (Sensitivity) of material resource

Value/Sensitivity	Typical Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

15.5.15 The second stage is an evaluation of the magnitude of impact that the proposed development is likely to have on the material source, including any impact on the future availability of the material resource it provides. The magnitude of impact has been determined on the basis of the descriptions described in Table 3.4N of LA 104 which are presented in Table 15.2.

Table 15.2 Magnitude of Impact

Magnitude of Impact		Typical Descriptors
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Magnitude of Impact	Typical Descriptors
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

15.5.16 The last stage of the assessment combines the value (sensitivity) of the material source, from Table 15.1, with the magnitude of impact on the material source, from Table 15.2, in order to arrive at a level of significance. The matrix created for the significance of effect is shown in Table 15.3 which is taken from Table 3.8.1 in DMRB guidance LA 104.

Table 15.3 Approach to Evaluating Significance of Effect

		Magnitude of Change				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Environmental value	**Negligible**	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Very High	Neutral	Slight	Moderate or large	Large or very large	Very large

15.5.17 As detailed in Table 15.4 (taken from Table 13.4 in DMRB guidance LA 110), effects that are defined as moderate, large and very large effects are considered to be significant while effects that are defined as neutral or slight effects as not considered to be significant.

Table 15.4 EIA Significance

Significance	Description
Significant (one or more criteria met)	Material assets: - Category description met for moderate, large or very large effect.
Not significant	Material assets: - Category description met for neutral or slight effect.

15.5.18 Table 15.5 provided further specific details in relation to materials for the varying level of significance of effects, taken from Table 3.13 in DMRB guidance LA 110.

Table 15.5 Significance Criteria for Material Assets

Significance Category	Description
Neutral	• Aggregates required to be imported to site comprise >99% reused/recycled content.
Slight	• Project achieves 70-99% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste to substitute use of primary materials; and • Aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional or national percentage target
Moderate	• Project achieves less than 70% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste to substitute use of primary materials; and • Aggregates required to be imported to site comprise re-used/recycled content below the relevant regional or national percentage target.
Large	• Project achieves <70% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste to substitute use of primary materials; • Aggregates require to be imported to site comprise <1% re-used/recycled content; and • Project sterilises ≥1 mineral safeguarding site and/or peat resource.
Very Large	• No criteria – use criteria from large category.

15.6 Limitations and assumptions

Limitations

15.6.1 The assessment of material resources for construction is still a developing area; detailed assessment guidance is therefore not yet available on some aspects of the assessment process. This limitation has been considered; LA 110 has informed, as far as possible, the methodology used for the assessment.

15.6.2 The LA 110 guidance is published by the DMRB as a guide for road schemes. In the absence of other suitable guidance for this proposed development, it is being used as an example of best practice guidance in reference to materials assessment.

15.6.3 The construction and operation of the proposed development would be carried out in accordance with normal good working practice implemented on major infrastructure projects. The normal good working practice is set out in the Outline CEMP (Appendix A2) which will include the environmental measures that would be adopted during the construction phase, such as a Materials Management Plan.

15.6.4 Whilst limitations exist, it is considered that the assessment of material resources from construction is sufficiently robust according to the guidelines set out in the LA 110 for the purposes of this ES.

Assumptions

15.6.5 It has been assumed, for the purposes of this assessment, that the imported fill will be composed of a mixture of Class 1 granular fill and Class 6F selected granular fill. These two classes of granular fill are of a high quality and can therefore be transported around the site of the proposed development and experience little degradation. See Specification for Highways Works[13] for further information on the differing grain sizes of these two classes.

15.6.6 Based on the programme, it is assumed that the creation of site levels, including the import of the fill material, will take place over a period of four years with the earliest start date in 2021.

15.6.7 Based on the findings of the ground investigations (Appendix D4) and the requirements for the proposed development, it is assumed that all material required for levelling the site will be imported.

15.7 Baseline Environment

15.7.1 The baseline environment is comprised of receptors which have been identified based on the likely impacts set out in LA 110. A list of the receptors which have the potential to be impacted by the proposed development is provided in Table 15.6 with the relevant phase of the proposed development.

Table 15.6 Receptors with the potential to be impacted by the phases of the proposed development

Receptor	Phase
Primary material sources (on-site)	Construction
Imported material sources (off-site)	Construction

Primary material sources (on-site)

15.7.2 The proposed development will locally cut into the existing topography in order to create drainage features. Where possible, primary material sources on-site will be reused on site, reducing the amount material imported to site and the amount of waste generated by the proposed development.

15.7.3 The South-East Wales Aggregates Safeguarding and Mineral Resources Map[14] shows that there are no mineral or aggregate sources on site, though there is a sub-alluvial superficial sand and gravel mineral resource located just to the south-west of the site.

15.7.4 Based on the above, the sensitivity of the primary material sources on-site is classed as ***low***.

[13] http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf
[14] https://www.bgs.ac.uk/mineralsuk/planning/resource.html#MRW

Imported material sources (off-site)

15.7.5 For the site levelling, the proposed development would require earthworks resources of Class 1 granular fill and Class 6F selected granular fill.

15.7.6 The South Wales Regional Technical Statement for Aggregates Latest Note (2019 draft[15]) identifies that the South Wales region has an overall land won sand and gravel reserves and landbanks, for permitted reserves, of 3.21 million tonnes (mt) and, for crushed rock, an overall landbank permitted reserve of 495.66mt.

15.7.7 In the Technical Note, the proposed development falls close to the border of two sub-regions: the Former Gwent sub-region and the Cardiff City sub-region. Each of these sub-regions are made up of a group of Local Planning Authority areas (LPAs). The proposed development is within the Cardiff Council administrative area (in the Cardiff City sub-region) but is adjacent to the border of Newport (in the Former Gwent sub-region).

15.7.8 Cardiff LPA had (in 2016) a landbank of 27.800mt of crushed rock, though Newport LPA had none. Both areas are predicted to experience a shortfall of crushed rock over the 30-year period (2006-2036) with Cardiff LPA requiring an extra 20.323mt and Newport LPA an extra 7.498mt.

15.7.9 Although potential land-based sand and gravel sources have been identified in both sub-regions, they are not currently exploited, and marine-dredged sand is instead obtained from the Bristol Channel, Severn Estuary and Bedwin Sands. No shortfalls in sand and gravel material sources are predicted for either area authority.

15.7.10 Despite this ready availability of sand, the predicted shortfall of crushed rock supplies means the overall sensitivity of these primary raw material sources is classed as high.

15.7.11 However, in addition to these primary raw materials, there are a number of producers of secondary and recycled aggregate, in the form of crushed concrete, subsoil and slag, in both authority areas. The Technical Note highlights that the industries in the Port Talbot area in South Wales are an important producer of secondary aggregates and that South Wales produces more recycled aggregate than North Wales at a ratio of 3 to 1 (in 2005 – more recent data is not available). These materials, if they fulfil the criteria required by the Specification for Highway Works[16] (which is being used as an example of best practice material specification), could be used in developments to partially or wholly replace the virgin materials mentioned above.

15.7.12 Consequently, due to the presence of these alternative sources of material, in the form of recycled and secondary aggregate, which alleviates the issues associated with the predicted crushed rock landbank shortfall for both Cardiff and Newport

[15] http://www.swrawp-wales.org.uk/Html/RTS%202nd%20Review%20-%20Appendix%20B%20(South%20Wales)%20%20-%20CONSULTATION%20version%20(English).pdf
[16] http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf

LPAs, the overall sensitivity of all these off-site material sources is considered to be ***low***.

15.8 Assumed construction practices

15.8.1 The following assumed construction practices, relevant to the material resources required for levelling the site of the proposed development are described in the Outline CEMP (Appendix A2) which would be secured through planning conditions:

- A Materials Management Plan (MMP) shall be developed to manage movement, import, reuse and disposal of materials. This shall include a specification for materials suitability for use criteria that are protective of both the water environment and human health;
- Areas will be clearly marked and managed to prevent them becoming overfilled and ensure that the areas are suitable for the materials stored;
- Physical barriers to stop material overspill;
- Bunded areas will be located on stable and on level ground and located away from watercourses, ditches and drains;
- Wherever possible, topsoil will be left in place to minimise the amount of unprotected ground exposed to runoff. Where topsoil removal is required it would take place as late as possible prior to other works in the area. Topsoil will be stored outside of the floodplain on level areas;
- Topsoil stockpiles would be created and managed in accordance with best practice guidance - refer to the Soil Management Plan for further details;
- Silt fencing would be installed around the margins of topsoil mounds to minimise the risk of sediment-laden runoff reaching watercourses;
- Cleared land would be reseeded as soon as practicable, to minimise exposed soil and subsequent sediment runoff; and
- Health and safety risk assessments will consider available chemical testing results for soils, groundwater and surface water and will inform identification of adequate mitigation measures.

15.8.2 For other and similar mitigation measures relevant to the existing ground conditions of the site, see Chapter 6: Ground Conditions.

15.9 Embedded mitigation

15.9.1 All material fill required for the site levelling would be sourced as close to the proposed development site as possible, ideally within Cardiff and Newport LPAs or the South Wales region. This will minimise the amount of transportation required, reducing fuel consumption and carbon emissions. The sources for the

materials will be agreed with the contractor, when they are appointed, further on in the proposed development's detailed design.

15.9.2 In addition, in order to reduce the significant of the effect from material sourcing, the materials required for site levelling would be sourced from secondary and recycled aggregates and primary raw materials at a ratio of 70:30. Thus, by ensuring 70% of the materials will be sourced from secondary and recycled aggregate sources, which have a low sensitivity, reduced pressure will be put on the predicted shortfall for raw crushed rock and the associated highly sensitive raw material source. This would be secured through a planning condition. Consequently, the use of a majority of recycled and secondary aggregates means the overall material source sensitivity can be classed as low, thereby reducing the significance of effect to not significant.

15.10 Assessment of effects

Assessment of effects from construction

15.10.1 Table 15.7 below details the estimated quantity of material usage required for the levelling of the proposed development during construction.

Table 15.7 Material resources required for construction

Material	Volume
Class 1 granular fill and Class 6F selected granular material	390,000m³ [17]

Primary material sources (on-site)

15.10.2 All material earthwork resources on site will be either retained and built upon by the imported earthworks resources or reused for landscaping within the site. Topsoil stockpiles will be created and managed according to best practice principles and replaced where appropriate.

15.10.3 The sensitivity of the primary on-site material sources is classed as ***low*** and the magnitude is classed as ***minor*** as the existing material resource will remain on site, though it will also be added to**.** The significance of effect is therefore classed as ***neutral or slight adverse*** and is thus not a significant effect.

Imported material sources (off-site)

15.10.4 Of the 390,000m³ of Class 1 granular material and Class 6F selected granular material required to level the site, a maximum of 30% (117,000m³) will be obtained from a mixture of crushed rock and marine sand primary raw material sources. The material would be sourced from local quarries in Cardiff, as per

[17] This volume is taken from the detailed design – see Chapter 6: Ground Conditions and the Introductory Chapters 1 to 3.

section 15.7.8. As Cardiff has a landbank of 27.800mt of crushed rock this would equate to 0.42% of the total available reserves.

15.10.5 Though the percentage is not yet known it is likely that marine dredged sand and gravel would also be used and would therefore reduce the percentage of crushed rock required; a mixture of sand, gravel and crushed rock would fulfil the criteria for Class 1 granular fill and Class 6F selected granular fill material as set out in the Specification for Highways Works[18]. Both Cardiff and Newport areas use licences to obtain marine-dredged sand; no details are available on the upper limits of this dredging but the amount required by the proposed development is assumed to be a negligible proportion of the whole.

15.10.6 The remaining 70% (273,00m³) of the required Class 1 granular material and Class 6F selected granular material will be obtained from recycled or secondary aggregate sources. It will need to be of a high quality to ensure it is suitable for use, meeting geotechnical requirements and chemical criteria to ensure it does not cause contamination of the ground or water or pose a risk to human health, as per the Specification for Highway Works[19]. As per section 15.7.11, there are a number of suppliers of secondary and recycled aggregate in South Wales.

15.10.7 The sensitivity of the imported off-site sources is therefore classed as ***low*** as 70% of the material used will be obtained from recycled or secondary aggregate sources. As only 30% of the material will then be composed of virgin crushed rock aggregate, this will only remove 0.42% of Cardiff's landbank which is a small percentage for one project (this percentage will also reduce further as marine dredged sand and gravel is used). In addition, the magnitude is classed as ***minor*** as it is anticipated that the Cardiff region will be able to meet the volumes required for both recycled and secondary aggregates and virgin aggregates**.** The significance of effect from the combination of the sensitivity and magnitude of imported off-site material sources is therefore classed as ***slight adverse*** and is thus not a significant effect.

15.11 Mitigation and enhancement

15.11.1 The assessment detailed above demonstrates there is no significant effect and therefore no mitigation is required.

15.12 Residual effects

Residual effects from construction

15.12.1 As there are no significant effects for materials, there are no residual effects from construction.

[18] http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/600.pdf

[19] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/296499/LIT_8709_c60600.pdf

15.13 Assessment summary matrix

Potential Effect	Receptor (s)	Sensitivity of Receptor	Magnitude (prior to mitigation)	Significance (prior to mitigation)	Mitigation	Magnitude (following mitigation)	Significance (following mitigation)	Comments
Construction								
Use of existing material resources	On-site material resources	Low	Minor	Neutral or slight adverse	N/A	Minor	Neutral or slight adverse (not significant)	No additional mitigation, aside from embedded mitigation
Use of imported material resources	Off-site material resources	Low	Minor	Slight adverse	N/A	Minor	Slight adverse (not significant)	Use of 70% secondary or recycled aggregate
Operation								
Assessment of operational effects scoped out (see section 15.1.5)								