6 GEOLOGY AND SOILS

6.1 Introduction

The purpose of this chapter is to give an understanding of the physical environment of the site for the proposed development of the Ince Resource Recovery Park (RRP) and the component parts that make up the CCC and DBERR applications which have been assessed both separately and together. Factors such as the physical nature of the site, including local geology and soils would affect the development in terms of its safety and integrity. This in turn would have direct and indirect impacts on the environment. This section should be read in conjunction with Section 7 Hydrology and Hydrogeology which deals with these specific aspects.

The site is bounded to the north by the Manchester Ship Canal, where the embankment constructed for the canal is approximately 3m above the site level, and much of the site has been reclaimed from marshlands of the Mersey Estuary. An elevation of between 2.9m AOD and 6m AOD is recorded across the site. To the north of the Ship Canal the Ince Banks and Mersey Estuary SSSI, Ramsar and Special Protection Area are present. South of the site is the Kemira Fertiliser plant and former Ince B Power Station site, now redeveloped as a glass manufacturing plant. Agricultural land is found to the west of site, rising gradually towards Ince village. Agricultural land is present to the east of the site, with an elevated ammonia pipeline running along the boundary from the Ship Canal to the Kemira works.

6.2 Study Methodology

6.2.1 Scope of Study

A desk-based assessment has been undertaken to assess the existing environmental setting of the site and the potential impact of the proposed development on the geology of the site. The study has been undertaken in general accordance with current UK guidance 'Model Procedures for the Management of Land Contamination' (CLR11) by taking into account potential historical and future contamination sources on site and their likely impacts upon sensitive receptors. This involved obtaining the following information:

- Geological and soils records;
- Other existing records, reports and surveys;
- Previous surveys undertaken at the site; and
- Enquiries to Landmark Information Group, the Environment Agency and the British Geological Survey.

Data were obtained for the site and the surrounding area and a site walkover undertaken in order to develop an understanding of the physical environment and setting of the site and of the likely environmental impacts of the proposed development.

Further information can be found within the Site Assessment report, included as Appendix 6.1. Note that effects on the water environment are discussed in Section 7 - Hydrology and Hydrogeology.

6.2.2 Assessment of Significance

Having established the existing environmental conditions through the utilisation of the methods discussed above, the EIA process assesses the significance of the proposed development of the site on the environment. In respect of this section it is the impacts on the physical environment that will be discussed. The general methodology used for the assessment of significance is described in detail in the following sections.

The significance of the residual effects, i.e. those remaining after mitigation measures, on the physical environment is also presented.

6.2.3 Magnitude of Impact

The magnitude of impact is defined as follows:

Table 6.1: Magnitude of Impact

Magnitude	Description
Large	Irreversible or long-term change well outside the range of natural variation where recovery could be protracted (>10years) to a large area or an area remote from the development. Potential health hazard.
Medium	A change outside the bounds of natural variation to a large area or an area remote from the development, which would recover over a medium period of time (5-10 years).
Small	A change within the bounds of natural variation to an area in close proximity to the site, which would recover over a short period of time (1-5 yrs).
Negligible	A change well within the bounds of natural variation. No effect detectable or recovery within a very short timescale (< 1 year).

6.2.4 Sensitivity of Receptors in the Physical Environment

In order to evaluate the relative sensitivity of receptors to the proposed development, a reference list defining the degree of sensitivity as indicated by the amount of change noted to the physical environment has been produced in Table 6.2.

Table 6.2: Receptor Sensitivity

Receptor Sensitivity	Example of Receptor
High	Designated sites such as RIGS or National Park.
Medium	Biological and chemical water quality within rivers and streams. Surface water (flow patterns).
Low	Soils.
Negligible	Impermeable geological strata.

6.2.5 Potential Significance

Potential significance has been assessed for the physical environment, based on the combination of the magnitude of impact and the sensitivity of the receptor and is described broadly by Figure 1.2 in Section 1. Note that Figure 1.2 is for guidance only and that the impact assessment is based upon professional judgement. The threshold for

significant impacts, where monitoring measures may be required, is where residual impacts are considered to be significant or very significant.

6.2.6 Phased construction of the developments

The developments would be constructed in a phased approach as discussed in Section 2. It is not anticipated that this approach to construction would significantly influence the potential impacts to the physical environment since the impacts relate directly to the areas affected by each phase. Some information is however provided in Section 6.4.1.1 with regard to the potential effects of sediment runoff and the need to keep operation and construction drainage systems separated.

6.3 Establishment of Baseline Environment

6.3.1 Geology

6.3.1.1 Superficial Deposits

Published geological maps indicate that the majority of the site area is underlain by superficial strata of Tidal Flat Deposits (see Figure 6.1). The Tidal Flat Deposits typically comprise alluvial silt, clay and fine-grained sand with gravel lenses. The Tidal Flat Deposits are underlain by Glacial Till (Devensian). Glacial Till is exposed at the surface with no overlying alluviual deposits in a small area (approximately 15ha) corresponding with the former location of Grinsome Farm. There is also a small outcrop of bedrock at this location. The Till comprises stiff silty, occasionally sandy clay, sometimes pebbly with a reddish brown appearance. The Till is also possibly interbedded with sand and gravel-rich lenses. No records of made ground or landslip are shown on published geological maps within the area of search.

6.3.1.2 Solid Geology

A fault orientated in a north-south direction is indicated across the site on the available solid geological maps (see Figure 6.2). The majority of the site lies to the east of the fault and is underlain by Kinerton Sandstone (Permo-Triassic) of the Sherwood Sandstone Group, which is undifferentiated and consists largely of soft red and mottled sandstone. The extreme western part of the site is underlain by the Chester Pebble Bed Formation of the Sherwood Sandstone Group. These are predominantly brown, horizontally bedded gravels with cross-bedded pebbly sand and sand. The gravel comprises well-rounded pebbles, cobbles and boulders in a coarse to fine gravel and silty sand matrix.

6.3.1.3 Borehole Records

The British Geological Survey (BGS) catalogue of available borehole records was consulted. The findings exhibited by the logs show that there is generally a good correlation with published maps.

The majority of the BGS boreholes are located on the western part of the site. The records demonstrate the presence of topsoil and superficial deposits (generally of clay, sand and gravel). The underlying bedrock was found to be sandstone, which was generally encountered at a depth of between 6m and 30m in these boreholes.

An investigation was made by Exploration Associates (1998) to provide information on the ground conditions at the Ince RRP site. Three boreholes were sunk during this investigation, which generally confirmed the published geology of the area. The

borehole logs report a thin layer of topsoil followed by a sequence of generally cohesive alluvial deposits (silty clay / clayey silt) containing distinct peat layers (black/ brown, fibrous and locally woody) of up to 4m in thickness. Coarse sand and gravel with a thickness of up to 10m was encountered beneath the alluvial clay in all boreholes, underlain by Glacial Till which had a maximum confirmed thickness of 10m and was reported to include bands of silty sand. Bedrock in the form of weathered red-brown mottled yellow sandstone was encountered at 8.75m below ground level (bgl) at one borehole location with no overlying Glacial Till present. The remaining boreholes confirmed superficial deposits to at least 25m bgl.

An investigation was carried out by WSP at the location of the proposed RDF plant in September 2006. The same general sequence of superficial deposits and bedrock was reported, however the bedrock was encountered at shallow depth (2.5m bgl) on the western part of the site. RSK was commissioned to carry out a separate ground investigation in respect of the waste facility close to Holme Farm on the north western part of the site (see Section 6.3.3.1). Four boreholes were drilled to a maximum of 7m bgl. The superficial deposits encountered comprised clayey silt and silty clay with bands of peat of up to 1.0m in thickness. No Glacial Till was encountered and bedrock was present at approximately 2.5m bgl at one location on the north-western boundary. The remaining boreholes (to 7m) did not encounter bedrock.

Since the peat layers encountered during the above investigations are overlain by silty clay and are not present at the surface they are not considered to be of significance as an ecological resource. The presence of organic alluvial sediments and particularly thick horizons of peat will however have implications for the engineering design of proposed developments. Furthermore, buried organic deposits have the potential for natural ground gas generation, and this would be taken into account in the design of building foundations to prevent gas ingress. If no significant reductions are proposed to current groundwater levels the ground gas regime is unlikely to be substantially altered from current conditions.

6.3.2 Soils

The majority of the site for the proposed development at Ince (nearly 90%) is underlain by soils of the Downholland 2 association. These soil types are located across most of the site, with the exception of small areas to the north and the west. Amongst other places this soil is documented as occurring along the southern bank of the River Mersey in Cheshire as a thick clayey estuarine alluvium. It is developed on Downholland Silt, a marine alluvium found on raised beaches above sea level. These soils vary widely in water regime depending upon the type and extent of artificial drainage. Where a pumped drainage scheme is installed, as in this case, the soils are well drained or only water logged for short periods in winter, making them fertile and suitable for arable cropping.

The Bridgnorth soil association is present underlying approximately 3% of the site, along its western edge. The Bridgnorth association consists of well drained reddish sandy and coarse loamy soils developed in Permo-Triassic sandstone.

The remaining 7% of the site is close to the River Mersey (along the northern boundary of the site) and no soil associations are given for this land. This is presumed to be marine sediment.

An investigation into the nutrient status of site soils was carried out by RSK in October 2007. The results of this investigation can be summarised as follows:

6.3.2.1 pH

The pH is neutral across the whole site, largely contained within a range between 6 and 8. This suggests a selection of species well adapted to neutral conditions, such as those typically occurring in mesotrophic grassland.

6.3.2.2 Nutrients

The concentrations of P and K are significantly greater than those found in semi-natural conditions. N on the other hand appears at concentrations lower than those suggested in literature for semi-natural habitats. The present use of the site seems to confirm a management based on improvement of grassland production with possible introduction of fertilizers or chemical substances.

Implications for ecological mitigation are discussed in Section 10 Ecology and in the Habitat Creation and Management Plan, appended to that section.

6.3.3 Ground Contamination

Potential areas of contaminated land identified from available records and historical maps are identified below.

6.3.3.1 Potential Contamination Sources on Site

The historical OS map record indicates that the vast majority of the site area is greenfield land with no significant former development which might have led to ground or groundwater contamination.

A registered waste treatment facility is identified as being located on the north western site boundary (Licence Ref No 61798/M01, dated 17 March 2007). This comprises two lagoons which have been present on site since at least 1991. The biotreatment facility known as Holme Farm is operated by J & D Willis. It has a permit to treat between 10,000 and 25,000 tonnes per annum of waste. Authorised waste includes mainly dredgings and sludges (see Table 6.3 below).

The storage of liquid wastes as described above represents a potential contamination source which may have led to localised ground contamination.

RSK was commissioned to carry out a limited site investigation at the location of the sludge lagoons operated by Holme Farm, in order to investigate the presence of soil or groundwater contamination. The investigation was carried out at the beginning of November 2007, and the results are presented in a separate report (Site Investigation, Holme Farm, Ince Marshes, Cheshire, 16017R1(00) December 2007) - see Appendix 6.2. The results of this investigation do not indicate significant impact to the underlying soil or groundwater as a result of the presence of the lagoons. Some slightly elevated land gas concentrations were detected, possibly derived from natural organic sources within the underlying soil as suggested in Section 6.3.1.3. Further investigation of gas concentrations may be necessary on other parts of the site, and it is anticipated that the incorporation of standard gas protection measures will be installed in building foundations.

The historical Ordnance Survey (OS) map record shows a small farm (Grinsome Farm) was located on the southern part of the site from the late 19th Century (and possibly earlier) until at least 1968 (see Figure 6.3). As with any such premises, some minor, highly localised ground contamination might have resulted from the storage of small

quantities of fuels for farm vehicles in this location. No former ponds (which may have been in-filled with waste materials) have been identified on the historical maps.

Table 6.3: Waste types at Holme Farm Facility

Waste type	Details
Dredgings from inland waterways	No further details
Industrial effluent	Treated sludge from tanneries; leaves, compost and bark sludge; paperwaste sludge; de-inked paper pulp; septic tank sludge; sludge from stone processing; sludge from waste food, drink and preparation materials; textile waste; waste hair from tanneries.
Waste lime and lime sludges	No further details

A railway line has been present at the location of the proposed rail line extension since at least the 1970s. It is likely that this has been used to transfer raw materials to the Kemira chemical works, and as such there is potential for ground contamination as a result of spillages or leaks from bulk storage containers carried by trains.

There is a significant amount of existing pipeline infrastructure on and close to the proposed RRP site, which has been present since at least the 1990s, and some for a longer period. The pipelines are as follows.

- Ammonia Pipeline: An above-ground pipeline which leads from the canal berth to the Kemira chemical works. The pipeline begins at a small off-loading enclosure on the front of the existing canal berth. It runs from the centre of the berth to a point on the eastern site boundary then runs due south along the boundary to the Kemira works. The pipeline is used to transfer ammonia delivered by ship.

- Water/Orimulsion Pipeline: This is a disused, below-ground pipeline which passes across the centre of the site in a southerly direction from the canal berth parallel to the access road and then west to the former Ince Power Station site. This includes a disused pumping enclosure on the canal front to the east side of the site. The pipeline was used for delivery of water, return of effluent and later for Orimulsion (emulsion of bitumen and water) delivery.

- Shell Pipelines: The Shell North West Ethylene Pipeline (NWEP) runs below ground in an easement which crosses through the canal berth site. A further eight Shell pipelines run in an easement immediately south of the ship canal.

There is the potential for ground contamination to have occurred as a result of possible leaks from the above pipelines. It is likely that leaks from above ground pipelines would have been identified and rectified through routine inspections. Leaks from below ground pipelines may be less evident, but for modern operational pipelines, regular testing and inspection is likely to ensure that leaks are unlikely.

6.3.3.2 Potential off-Site Sources

Industrial Sites

The historical OS maps indicate that the Kemira Chemical Fertiliser works located to the immediate south east of the site has been present since at least 1975. This is a large facility which occupies over 24 hectares. The maps show the facility to include several above ground bulk storage tanks within 100m of the site boundary.

A power station (now demolished) was present to the south west of the site (approximately 250m to 500m distant), and to the immediate south of Kemira Road since at least the 1960s, and the maps of 1999 show it to have been extended and located immediately adjacent to the western boundary of the site. The site has been redeveloped as a glass manufacturing facility by Quinn Glass.

Such industrial land-uses, and in particular the bulk storage of materials (e.g. fuels and chemicals) in close vicinity (i.e. within approximately 500m) represent potential off-site sources of contamination, and the potential for the migration of mobile contaminants (e.g. via groundwater) onto the site cannot be discounted. The Stanlow oil refinery to the west of the site is approximately 1km distant and as such it is considered unlikely that migration of contaminants from this source onto the site has taken place.

Existing and Closed Landfill Sites

Two former landfill sites are noted to be within 500m of the site boundary:

- The former Ince power station landfill site is approximately 110m to the south of the southern boundary of the main site area but to the immediate west of the proposed rail line extension. The Ince power station landfill (referenced EAHLD32047) is recorded to have accepted industrial wastes and liquid sludges. Prior to 1977, a small lagoon formerly licensed to CEGB (referenced Z60314) adjacent to the west of the Power Station landfill was authorised to accept boiler washing solutions, iron and vanadium compounds. A further small former landfill to the south west of the power station landfill is referenced EAHLD17078 and was licensed to accept waste including liquid sludges (no further details provided).

- A former landfill known as Ince Tip is situated approximately 240m west of the site. This was licensed until 1977 to accept construction and demolition wastes, house and commercial 'untreated' waste, non-hazardous industrial waste and sewage waste.

- The Kemira Chemical Works to the south of the site includes a landfill (licence number 53980) some 400m to the east of the eastern site boundary. No details are provided of the wastes that are accepted at the site, however it is categorised as an industrial waste landfill.

The industrial sites, waste treatment and disposal facilities described above represent potential contamination sources, and contaminant migration (including landfill gases such as methane) onto the site from these sources cannot be discounted. This is a situation common to many industrial sites.

Pollution Incidents

There have been three recorded pollution incidents to controlled waters within 500m of the site boundary. The first was located 150m from the site involving an spillage petrol to a watercourse in 1995, a second was 135m from the site involving the release of inert suspended solids to the Manchester Ship Canal also in 1995 and a third 267m to the east involving release of phosphoric acid to the Manchester Ship Canal in 1991.

The above pollution incidents were classified as minor incidents and took place outside the site boundary. The incidents were recorded to have impacted surface water courses.

There has also been one prosecution relating to unauthorised tipping/dumping of clinical waste in 2003 at the western boundary of the site.

6.3.4 Sensitivity of Receptors

There are a number of sensitive receptors that have the potential to be affected by the potential contamination sources identified above. These include:

- The majority of the site is underlain by superficial deposits which are classified as a minor aquifer. The underlying sandstone bedrock is classified as a major aquifer, although the water quality within this aquifer is likely to be affected by saline intrusion, which reduces the sensitivity of this receptor. Furthermore the presence of low permeability Glacial Till on some parts of the site would be expected to provide some protection to the underlying sandstone from the downward migration of contaminants (if present). There are no groundwater abstractions (e.g. private water supplies) within 500m of the site boundary.
- The site is close to the tidal estuary of the River Mersey, located to the north of the site boundary and the Irish Sea. Ince Banks and the Mersey Estuary are designated as a SSSI, a Ramsar site and a SPA.
- The Manchester Ship Canal.
- The site is crossed by several drainage ditches resulting from the land drainage regime of the proposed site. All of these drain to the EA pumping station which in turn pumps to the Manchester Ship Canal. The Hornsmill Brook/Hoolpool Gutter, located 110m to the east of the site, lies at a higher elevation than the RRP site drainage and drains an area of agricultural land south of the proposed site. It ultimately flows north to the River Mersey.
- Neighbouring residents and surrounding areas. The closest dwelling is Holme Farm at approximately 400m to the west of the developed part of the site. The villages of Ince and Elton lie within 1km of the developed part of the site.

6.3.5 Characteristics of Proposed Developments

6.3.5.1 Characteristics of the development which may impact the physical environment

The following points are characteristics which would apply during the construction phase of both the CCC Application and the DBERR Application. The impacts relating to these characteristics for each application (and both in combination) are discussed in Section 6.4.

As part of the proposed construction the land would be raised where necessary in parts of the site to be developed with buildings to achieve an elevation of at least 5.063m AOD. Areas in which roads are to built would be raised where necessary to achieve an elevation of at least 4.763. The site elevation currently varies between 2.9m and 6.0m AOD and as such many parts of the site would require elevation through the importation of fill materials. In addition, some topsoil removed is expected to be exported from the site (see Section 6.4.1.2).

A new rail link is to be constructed extending from the southern part of the site. This would require some land take.

Prior to the extension of the existing canal berth a dredging operation would be undertaken as a part of ongoing lawful canal dredging operations. Dredgings would be transported to the Frodsham Deposit Grounds located to the east of the site, which are already utilised for this purpose and which hold a suitable Waste Management Licence. Whilst canal sediments are likely to be disturbed during the construction of the new

canal berth, this is not considered to be a significant impact, since canal dredging and deposition takes place along the canal as an ongoing operation. The deposition of site-derived canal dredgings is not anticipated to substantially increase the level of impact to the Frodsham Deposit Grounds from that already generated by the deposition of dredgings.

Further work on the current canal berth would involve strengthening of the quay and construction of lighting towers. Strengthening of the quay would involve piles in 40 rows of three piles, along the length of the quay. No piling would take place within the canal itself.

6.3.5.2 Potential Polluting Substances Relating to Construction Operations

During construction the following aspects could lead to ground contamination. These aspects apply during the construction phase of both the CCC Application and the DBERR Application (and the two in combination) since they are common to most construction activities:

- *Site drainage* - Incorrect disposal of materials into either storm water or foul drainage systems could result in environmental damage.
- *Delivery of construction materials* - Overfilling and incorrect filling of storage tanks can lead to spillages which could lead to ground contamination.
- *Storage and handling of materials/oils/chemicals* – in particular fuels and oils.
- *Waste management* - Correct handling, storage and disposal of waste materials are vital if pollution is to be avoided;
- *Refuelling of plant and equipment* - Fuel spills during the refuelling of plant have the potential to cause pollution causing contamination to ground, groundwater, and surface water features.
- *Contaminated land* - During the construction phase, operatives may come across previously unidentified contaminated land.
- *Concrete mixing* - Concrete is highly alkaline and corrosive and can have a detrimental impact on watercourses.
- *Invasive Weeds* – During the construction phase, there is the potential for encountering invasive weeds such as Japanese Knotweed. To spread such plants is an offence under the Wildlife & Countryside Act 1981 (as amended).
- *Silt Management* - silt generated from excavations, exposed ground, stockpiles, plant, wheel washing and site roads can create significant pollution if not controlled.
- *Noise* – Potential disturbance to local residents. See also Section 15.
- *Dust* – Dust can create atmospheric nuisance and also create silt problems when wet. See Section 8 of this ES for a discussion of impacts to Air Quality.

6.3.5.3 Potential Polluting Substances Related to the Operation of the Site

Once the site is operational the processes below have the potential to cause pollution. These have been divided between the CCC and DBERR applications. These impacts relate to operational processes and are summarised in Table 6.4.

RDF Plant – DBERR Application

The RDF plant would combust approximately 600,000 tonnes per annum of non-hazardous RDF and inert bottom ash and fly ash would be produced by the process as well as hazardous flue gas treatment (FGT) residue comprising calcium rich compounds (which can act as skin irritants) and heavy metals.

A small amount of water purged from the condenser and cooling tower of the RDF plant would be discharged into the Manchester Ship Canal in accordance with a discharge consent. The volume of water is considered to be negligible compared to the canal volume (see Section 7.5.5).

Soil Treatment Facility – CCC Application

The soil treatment facility would import contaminated soils for stockpiling; the end-products of this process would be clean sand and gravel and organic materials, and filtercake would be produced as a waste material. This would contain the fines separated during the soil washing process, and may contain inorganic and organic contaminants and possibly flocculants (if used), depending on the character of the soil that was treated. The correct handling and disposal of the filtercake is essential to prevent ground contamination. Hence all imported soils would be deposited on enclosed areas of concrete hardstanding. This would be expected to prevent the leaching of mobile contaminants to underlying soils and groundwater (see also Section 7.5.5).

Canal Berth – Both Applications

Procedures for the careful management of the transfer of materials to and from canal barges would be required in order to prevent spillages of potentially harmful materials to soil, groundwater or surface water in the canal. It is anticipated that hardstanding would cover the majority of the canal berth area adjacent to the canal which would be expected to contain such spillages. Potentially contaminated material would be stored and transported in sealed containers.

Plastic, Timber & WEEE Recycling – CCC Application

Plastic and timber recycling plants would be present on site, receiving mixed plastics and timber products for sorting and reprocessing. The non-recyclable wood and plastics are used as RDF or sent to landfill. Waste Electrical and Electronic Equipment (WEEE) would also be dismantled onsite to generate a range of material streams, including plastics, precious metals, ferrous and non-ferrous metals, electrical components and glass.

Waste Management Facility – CCC Application

The proposed Waste Management Facility would generate waste materials during these processes including recyclate from the materials reclamation facility (MRF). This would include materials such as newspaper and magazines, cardboard and mixed paper, steel and aluminium beverage cans, plastic bottles, textiles, and glass, also residual waste from MBT, comprising mostly dry and odourless inert material, and residues

from the composting process which are expected to have low contamination levels due to collection controls.

Ethanol Manufacture – CCC Application

During the manufacture of ethanol 60,000 tonnes of carbon dioxide would be created as a by-product. Storage capacity for less than 5,000 tonnes of ethanol would be present on site.

Table 6.4: Summary of Inputs and Outputs Relating to Processes

Process	Inputs	Outputs	Waste Products
DBERR Application			
RDF (Refuse Derived Fuels) Power Plant	RDF, Hydrated Lime, Powdered Activated Carbon, Fuel Oil	Electricity	Ash (inert bottom ash and inert fly ash), Hazardous FGT residue
CCC Application			
Soil Treatment	Contaminated soil	Clean sand and gravel	Filtercake
Plastics	Mixed plastics	Processed plastics	Residues from processing
Waste Electrical and Electronic Equipment (WEEE)	Various electrical and electronic items	Ferrous/ non- ferrous metals and plastics	Non-recoverable material (some may be suitable as RDF)
Timber	Mixed Timber	Timber products	Sludges from base of storage tanks, contaminated sawdust, filtercake
Waste Management Facility	Municipal mixed waste	Recyclate from MRF/MBT, RDF,	Residues from MBT, Residues from compost
Bio-Ethanol Plant	RDF + Wood chip, Straw + agricultural waste	Liquid ethanol, Liquid carbon dioxide.	RDF

An estimate of quantities for the above is provided in Appendix 2.1.

6.4 Identification and Assessment of Potential Impacts

6.4.1 Construction

6.4.1.1 CCC Application

General Construction Activity

Bedrock would not be anticipated to be encountered during the majority of the construction works, with the possible exception of the areas where piles are to be constructed (including the work to strengthen the quayside at the canal berth). In addition, the previous site investigations have indicated bedrock to be present at shallow depth on the north western part of the site and also at the location of the former farm on the south western part of the site, where sandstone outcrops at the surface. Impacts to geology are expected to be small due to the modest quantities to be removed in relation to the geology of the area and the site itself, and the receptor sensitivity is judged to be low since there is no significant environmental value to materials to be excavated. Significance to geology is hence judged to be slight.

The underlying soils and superficial soils are considered to be of low environmental value since the soils are not of a high agricultural value or with high susceptibility to

damage. The magnitude of the potential impact of removal of soils across the site is considered to be small to medium. The significance of potential impacts to underlying soil and geology as a result of excavation and removal of soil due to construction is considered to be slight.

As with any construction project, the following potential impacts associated with general construction activity are relevant to construction activity on the whole site.

- There is the potential for ground contamination by fuel oils and associated lubricants during construction plant refuelling and maintenance. This might affect any part of the site in which vehicles are used.

- Run off from the construction site potentially containing silt, fuel oil and other associated lubricants, chemicals or cement slurry could, particularly during flood events, cause impacts to local watercourses.

- Construction vehicles have significant potential to cause damage to equipment and materials on site. Attention should therefore be given to delivery routes in relation to both underground services such as drains and above ground items such as fuel transfer pipes.

- The cut and fill and topsoil movements are normal construction operations and are not expected to have any significant impact outside of the immediate boundary of the works. Topsoil is intended for re-use on site but surplus materials may be disposed of off site under appropriate waste disposal licensing. Care would be taken to manage stockpiles of topsoil materials in order to reduce runoff from exposed surfaces, and minimise soil compaction.

- The management of sediment stockpiles and other areas of exposed soils would be an important consideration, particularly if a phased approach is adopted for construction. Failure to manage silt and sediment runoff could result in sediment build up in newly constructed drainage on completed parts of the site.

However these impacts are judged as of a small magnitude as significant spillages are unlikely to occur with standard construction protection measures, and careful management of drainage issues (as detailed in Section 7.6) with contained drainage channels, constructed in advance, would reduce potential impacts of siltation. Again, receptor sensitivity is low and hence significance is judged to be slight.

Contamination

The majority of the site area has not been developed and has little potential for historical ground contamination. There are however some localised potential contamination sources, which include underground pipelines, and also neighbouring off-site facilities with the potential to have caused groundwater contamination and / or landfill gas which could have migrated onto the site. The possibility of encountering existing soil or groundwater contamination during construction cannot be discounted, and it should be considered as a potential risk to site construction workers. Clearly, if the site is affected by contaminants derived from off-site sources they are more likely to be encountered at the site periphery. The possible presence of off-site contamination and landfill gas and / or natural ground gas would be mitigated against through standard construction techniques, implemented via planning condition as required, following site investigation, as per Section 6.4.2 below.

The potential for construction to lead to the leaching of contamination into surface waters or groundwater is small since the site is not, based on the investigations

undertaken, subject to significant contamination and likelihood of release is also low. Sensitivity is judged to be medium, which would normally produce a moderate significance of impact, however, in this case, significance is judged to be slight due to the likelihood of occurrence, though it is recognised that impact could rise to moderate if release to wider environment occurred.

A section of the existing above-ground ammonia pipeline would be moved as a part of construction to allow works on the canal berth. This would avoid the potential for leaks from the pipeline and the underling soil becoming contaminated by ammonia through damage during construction and operational activities.

The disused Water/Orimulsion pipeline would be either decommissioned (pigged and grouted) before being left in situ, or removed from this area completely (following pigging). Unless properly controlled, the process of removal has the potential to lead to the release of potentially contaminative substances (including hydrocarbons) to the surrounding soil. However this is judged to be a small magnitude of impact when properly controlled on a low to medium receptor sensitivity. Impacts are hence judged to be of slight significance.

The buried Shell pipelines would remain unaffected and their easements would be largely unaffected excepting three bridged/culverted crossings of the eight-pipeline easement and adjacent watercourse, and construction above the NWEP pipeline across the berth. The magnitude here is assessed to be negligible to small on a high receptor sensitivity (as release could result in widespread contamination), hence significance is moderate. Potential damage to other services is judged to be of slight significance.

The construction of the canal berth would involve the excavation of materials by dredging, which would cause some disturbance to existing canal sediment (a low sensitivity receptor since they are not a valuable soil resource), however, dredging is already carried out as a part of ongoing lawful operations on the canal. Dredgings from the canal during work on the canal berth would be disposed of off-site to the Frodsham deposit grounds. Since periodic dredging of the canal is understood to take place and therefore sediment volume and hence disturbance is of small magnitude due to the low extent of dredging required, significance is therefore likely to be slight.

6.4.1.2 DBERR Application

The potential impacts during construction of the buildings proposed as part of the DBERR Application would generally be the same as described above. Since the application involves development at the site periphery, there is the same potential for contamination derived from off site sources to be encountered. The DBERR application area is crossed by the ammonia pipeline, and proposed access roads as part of this application are crossed by the power station pipeline. The Shell pipelines also have the potential to be impacted during the construction of the canal berth as part of the DBERR Application.

The WSP Geotechnical report recommends that the RDF plant be constructed on piled foundations, which would be supported through skin friction and end bearing on the underlying superficial clays (Glacial Till) rather than the bedrock. No significant adverse impacts are anticipated as a result of this foundation type.

The construction activity would affect a significantly lesser area than for the CCC application (or the two together), hence the magnitude of impact on soils (with very little land raising required by comparison) would be reduced to small, though the impact is still assessed as slight. Timescales for construction of the RDF plant are longer than for individual elements of the CCC application.

6.4.1.3 Entire Site

The potential impacts during construction of the buildings for the entire site would be the same as described above, including the piled foundations of the RDF. There is the same potential for contamination derived from off site sources to be encountered.

6.4.2 Operation

6.4.2.1 CCC Application

Site Operations

A list of potentially polluting substances for each of the site uses is provided in Section 6.3.5.3. The main potential impacts from general operational processes can be listed as follows:

- All raw materials and waste materials associated with the soil treatment facility (filter cake) plastics processing facility, timber treatment facility, waste management facility and bioethanol plant would require appropriate storage and containment, including adequate drainage systems. Accidental contaminant spillages or process discharges that exceed drainage discharge consents have the potential to adversely impact soil and groundwater, with associated impacts to controlled waters and / or human health. The likelihood of such occurrences is low hence magnitude is assessed as negligible to small. As above, soil and groundwater are assessed as low and medium sensitivity respectively hence significance is again assessed as slight.
- Flooding events during operation may result in the mobilisation of contaminative materials that are stored on site, and impacts to soil and/or groundwater. Assessed as a negligible to small magnitude (due to low likelihood of occurrence) on a low (soils not of a high agricultural or other value) to medium (groundwater) sensitivity of receptor. Impact significance is hence assessed as slight.
- Direct release of contaminants to air or water due to unplanned and emergency events have the potential to cause environmental damage. Assessed as a negligible to small magnitude (due to low likelihood of occurrence) on a low (soils not of a high agricultural or other value) to medium (groundwater) sensitivity of receptor. Impact significance is hence assessed as slight.
- Water used in fire fighting can carry liquid and solids into the site drainage system and then into water bodies. The magnitude of impact here is assessed to be negligible since the event is unlikely and the controlled drainage would be expected to contain water. On a Low to Medium sensitivity receptor, impact is assessed as being none to slight.

Potential Sources of Contamination

A number of potential contamination sources have been identified and assessed, both on and off-site. The on-site sources include the existing waste lagoons, which have been subject to preliminary site investigation, and existing pipeline infrastructure. The investigation of the waste lagoons has included a perimeter borehole drilling assessment with soil and groundwater analyses and this has not identified any significant impact to the surrounding area. Further detailed investigation and remedial works would be required for this area in advance of the development and the implementation of the remedial works would mitigate any significant contamination issues.

For the potential off-site contamination sources, while there is always some potential for contamination to affect the site, it is considered that this could be mitigated against by undertaking appropriately detailed site investigations along the site boundaries close to potential off-site contamination sources. Such investigation work is likely to be required for the whole site under standard planning conditions, as is usual for such development sites. Based on the presently available information there are no known sources of contamination in the vicinity of the site which might prelude development and which would be considered an unacceptable risk. If future investigations did reveal any significant contamination issues then remedial options would be implemented in advance of any development.

With regards to the potential for release of existing contamination, the potential for operation to lead to the leaching of contamination into surface waters or groundwater is negligible since the site is not, based upon the investigations undertaken, subject to significant contamination and likelihood of release is also low due to contained drainage. Sensitivity is judged to be medium which gives a none to slight significance of impact.

6.4.2.2 DBERR Application

The general points listed above apply to the DBERR Application, though potential for releases during operation of the RDF is lower than for the CCC application facilities. In addition, the following points refer specifically to the potential operational impacts of the DBERR Application:

- Combustion products have the potential to result in dusts and other materials, which may be transported and deposited in the site vicinity with potential impacts to soil or groundwater; and
- The release of potentially contaminative liquids by accidental or deliberate opening of discharge valves or the accidental spillage of filtercake or flue ash during the disposal process could result in ground or groundwater contamination.

The likelihood of such occurrences is low and therefore the magnitude of releases of combustion products or contaminative liquids is considered to be negligible to small and the sensitivity of the receptor soils is low. The overall significance of the potential impacts is therefore considered slight.

6.4.2.3 Entire Site

The impacts discussed under both DBERR and CCC applications above apply to the whole site.

6.5 Mitigation Measures

6.5.1 Construction

Entire Site

The following mitigation measures would be undertaken during construction of all buildings.

Prior to the construction work, standard engineering site investigations would be carried out on all parts of the site. Should evidence of ground contamination be encountered during these works it may be necessary to carry out some further, small scale, investigations into the presence of contamination.

Should ground contamination be encountered on any part of the site during initial investigations or during construction some remediation works may be necessary. Contaminated soil or groundwater would be treated by means of the best available technology (not entailing excessive cost), and a site-specific remedial strategy would be developed should this be considered necessary.

Few specific mitigation measures are required in respect of the geology at the site during construction. Construction plans would be required to incorporate measures to prevent uncontrolled releases of potentially contaminative substances to ground. If best environmental practices are followed the potential for release of contaminants to ground would be minimal. Appropriate spill and leak containment systems are proposed to be incorporated into the construction procedures to ensure no uncontrolled releases of contaminants occur.

Other mitigation measures required during construction would include control of run-off to prevent large quantities of silt entering surface watercourses, controls on discharge of effluent to water, provision of refuelling areas for plant, appropriate land capacity for fuels stored on site and spill control and mitigation procedures.

Standard construction measures would be adhered to as discussed below and in Sections 7 (Hydrology & Hydrogeology) and 18 (Environmental Management). The use of toolbox talks in order to communicate the potential impacts to site personnel and adherence to method statements would ensure that control measures are effective in preventing impacts to the physical environment. Examples of such measures include the following and are aimed at controlling the potentially polluting substances identified in Section 6.3.5.2.

- *Site drainage* - Surface water drains would be designed to carry only uncontaminated water. Foul drains would carry contaminated water to a sewage treatment works for treatment prior to discharge into a watercourse only when a consent has been granted by the sewerage undertaker.

- *Storage and handling of materials/oils/chemicals* - All such materials would be stored in a designated area, lockable, with access via designated key holders/storesman/materials controller to enable effective control. Use and handling of such materials would be made with care, so as to prevent the potential for spillage to ground or contamination to surface water features. All fuel and oil would be held within fuel safe containers, and have a secondary containment system either by means of integrally bunded tanks / bowsers, or by means of a suitably constructed masonry bund, both of which to be capable of retaining at least

110% of the total capacity of the tank / container. All such containers to be labelled as to the contents and maximum capacity and be locked when not in use.

- *Refuelling of plant and equipment* - All operatives on site would be inducted and made aware of best practice requirements when refuelling on site. Including use of designated refuelling areas (where possible), drip trays and funnels, and the provision of spill kits at conspicuous points to enable effective action to be taken if a spill were to occur. All mobile plant and equipment using fuels/oils would be contained within a drip tray at all times to minimise the potential for a pollution incident on site during the construction phase.

- *Contaminated land* - During the construction phase, operatives may come across previously unidentified contaminated land. Reporting procedures would be put in place to ensure any such identification is escalated to senior management promptly to allow for effective corrective action. Suitable controls would be in place to ensure any excavation of contamination is done in a manner which prevents cross contamination with other uncontaminated arisings stockpiles.

- *Concrete mixing* - Concrete mixing is to be undertaken in designated areas to minimise the potential for impact on watercourses. Areas would be sited away from drains or identified surface water features. Washout of concrete wagons or mixers would be carried out only within designated areas again sited away from watercourses or site drainage.

- *Invasive Weeds* – Site operatives would be made aware how to identify these weeds, including a site walkover prior to works commencing to ascertain whether present in the proposed construction area. The spread of these weeds through poor control on site and inadvertent cross contamination through ignorance or poor practice would be eliminated through training and effective control on site from senior management. A mechanism would be in place to report all incidents to site management for effective escalation and corrective action.

- *Silt Management* - All site operatives would be made aware of drainage arrangements on site (where applicable). A strategic approach would be taken to effective silt management on site utilising a variety of preventive and corrective measures such as review of task and likelihood of generating excess silt, protecting drains using terram/straw, providing a regular road sweep/road brush to keep access roads clear of mud (and resulting silt), providing wheel wash facility prior to allowing vehicles to leave site (ensuring a closed loop recycling system or tinkered effluent system in place for the suitable removal of waste material), sheeting/battering stockpiles, sheeting lorries (i.e. when muck shifting). In extreme circumstances stone filled grips may be considered, however it is envisaged that the measures highlighted above would be effective.

- *Noise* – Strict adherence to assigned working hours (as detailed in Section 2.8.2) would be made. Use of low level noise plant and machinery would be made wherever possible, e.g. use of generators and compressors with low noise (e.g. operating at less than 65 db (A). Noise is discussed further in Section 15 of this ES.

- *Dust* – This would be effectively monitored and managed on site so as to prevent nuisance issues. Controls would be in place to ensure dust is minimised e.g. sheeting lorries during muck shift operations) and utilisation of water sprays to enable dampening down of road and alleviate potential dust problems. Careful

consideration would be made of potential silt issues and the relevant controls (as identified above) applied to silt management.

- *Dredging* - Where canal dredging is to be carried out, this would follow standard procedures for this operation with regards to testing etc.

CCC Application

All of the above points are relevant to the construction of buildings proposed as part of the CCC Application.

DBERR Application

All of the above points are relevant to the construction of buildings proposed as part of the DBERR Application.

6.5.2 Operation

CCC Application

The following mitigation measures are relevant to operations proposed under the CCC Application

Site operations would be subject to a series of consents depending on the operation concerned. This would include PPC consent (already obtained for the RDF plant – see Section 8), waste management licensing and separate consents for water abstraction and discharge. Each process would hence be strictly regulated by the relevant authority in terms of its potential to pollute to all media, and this would be a minimum basis for mitigation. Based on the impacts that have been discussed in Section 6.4.1, the following mitigation measures are proposed:

- All raw materials and waste materials generated by the soil treatment facility (filter cake) plastics processing facility, timber treatment facility, waste management facility and bioethanol plant would be provided with appropriate storage and secondary containment. All surface drainage systems would be adequately contained as detailed in Section 7 and waste waters would be treated in the site waste water treatment plant.
- Discharges would be periodically monitored to ensure that contaminant concentrations remain within the bands allowed by the discharge consents. PPC requirements would apply to discharge monitoring.
- Any procedures requiring release of discharge would require method statements to be adhered to, to ensure that accidental releases do not occur.
- An emergency response plan would be produced to ensure that the risks of unplanned events such as fires are minimised. Should these events occur, the emergency response plan would detail the action to be taken to minimise environmental impacts from fire, fire-fighting water or combustion products.
- Spill kits would be maintained to seal drains and confine spills.
- Mitigation measures relating to gas and vapour hazards are discussed in Section 8 (Air Quality).

- Mitigation measures relating to discharge and drainage hazards are discussed in more detail in Section 7 (Hydrology and Hydrogeology).

DBERR Application

Most of the above points are relevant to the operational phase of the DBERR Application.

With regard to specific impacts of this application, in order to prevent the release of potentially hazardous contaminants to soil or groundwater, the combustion residues (e.g. Flue Gas Treatment residues) generated by the RDF plant and all other potentially contaminative materials would be appropriately stored on areas of hardstanding provided with contained drainage systems linked to the site waste water treatment plant.

Entire Site

The above points together apply to the Entire Site.

6.6 Cumulative Impacts

Table 1.3 in Section 1 lists all proposed developments which have been assessed in terms of their potential to provide a cumulative impact to the proposed Ince RRP. Several proposed developments are not considered to represent a potential contributor to cumulative impact to soils and geology for either the CCC or DBERR Applications (or both in combination) by virtue of their separation distance from the site. This is considered to apply to the following; INEOS Chlor, Port Weston, Liverpool Airport, 2nd Mersey Crossing, Bioessence (EfW) Eastham, Stanney Mill Road, Rushton Site, West Backford Cross, Cheshire Oaks (EMP5 B and C) and all developments proposed under the Cheshire Waste Local Plan.

The developments at Quinn Glass and the remainder of the Quinn Allocation have been considered in terms of potential for cumulative impact due to their close proximity and the previous industrial history of this site. The Environmental Statement prepared by Babtie Group in 2004 indicated that hotspots of hydrocarbon contamination were identified on the Quinn site and that they were to be remediated prior to redevelopment. This provides an indication this site as a potential source of historical contamination as a result of the former power station. Assuming, however, that the remediation has been undertaken and that standard working practices and mitigation measures are employed in construction, the overall quality of the soil and underlying geology is likely to improve through the process of redevelopment rather than deteriorate. The potential for cumulative impact as a result of this development in addition to the CCC or DBERR Applications (or both in combination) is therefore considered negligible.

The remainder of the Ince allocation (EMP4) lies adjacent to the proposed development. However, no contamination issues are believed to relate to this site, hence cumulative impacts are likely to be limited to those on soils and geology generally from construction operations, an impact that is also considered negligible. Again this applies to the CCC or DBERR Applications (or both in combination).

6.7 Predicted (Residual) Impacts

During the construction of buildings as part of both the CCC Application, the DBERR Application or the two in combination, RSK considers that the soils and near surface alluvium may be significantly impacted, however, this is normal for any construction project. It is anticipated that such materials would either be removed from site or reused in landscaping on site. Depending upon the extent of any excavations and the proposed foundation designs for the developments, superficial deposits and sandstone may or may not be impacted. It is not anticipated that the underlying geology would be impacted to any unusual extent as a result of the construction of new buildings for either the CCC or DBERR Applications (or both in combination).

As per the sections above, a number of potential contamination sources have been identified and assessed, both on and off-site for which mitigation measures have been identified. For the potential off-site contamination sources, this would involve undertaking appropriately detailed site investigations along the site boundaries close to potential off-site contamination sources. Such investigation work is likely to be required for whichever parts of the site are developed under the CCC or DBERR Applications or both in combination) under standard planning conditions, as is usual for such development sites. Based on the presently available information there are no known sources of contamination in the vicinity of the site which might prelude development or which would be considered an unacceptable risk. The impacts relating to contamination are hence judged to be slight for both applications (and the two in combination).

During operation of the facility the impact to the underlying geology and to site hydrology and hydrogeology is anticipated to be slight when appropriate mitigation measures are followed. This applies to the CCC Application, the DBERR Application and the Entire Site.

The significance of the residual impacts are summarised in Tables 6.5 to 6.7 below, for the CCC Application, the DBERR Application and the two together respectively.

Table 6.5: Significance of Residual Impacts - CCC Application

Aspect	Magnitude	Receptor Sensitivity	Significance
Geology (refer to Section 6.3.1)			
During construction			
Excavation of superficial deposits and bedrock for foundation construction	Small	Low	Slight
Soils (refer to Section 6.3.2)			
During construction			
Removal of soil where foundations are constructed	Small-Medium	Low	Slight
Flooding events resulting in mobilisation of contaminative materials stored on site with impacts to soil and/or groundwater	Negligible to Small	Low to Medium	Slight
Impact to soils from fuel, lubricants, chemicals and cement slurry	Small	Low	Slight
Disturbance of canal sediments during dredging (if required)	Small	Low	Slight
During Operation			
Contaminated process discharges impacting soil	Negligible to Small	Low to Medium	Slight
Pollution events due to large releases of liquids	Negligible to Small	Low to Medium	Slight
Direct releases to the environment due to fire etc, including combustion products	Negligible to Small	Low to Medium	Slight
Release of fire-fighting water into drainage system	Negligible	Low to Medium	None to Slight
Ground Contamination (refer to Section 6.3.3)			
During Construction/Operation			
Leaching of contamination into surface waters	Small	Medium	Slight
Leaching of contamination into groundwater	Small	Medium	Slight
Existing Pipeline Infrastructure (refer to Section 6.3.4)			
During construction			
Damage to above and below ground services due to vehicle movements and construction activities	Small	Low	Slight
Damage to buried Shell ethylene pipeline during crossing construction	Negligible-Small	High	Moderate
Release of contamination during decommissioning of power station pipeline	Small	Low-Medium	Slight
Cumulative Impacts			
All proposed developments and allocations	Negligible or None	Various	Negligible

Table 6.6: Significance of Residual Impacts - DBERR Application

Aspect	Magnitude	Receptor Sensitivity	Significance
Geology (refer to Section 6.3.1)			
During construction			
Excavation of superficial deposits and bedrock for foundation construction	Small	Low	Slight
Soils (refer to Section 6.3.2)			
During construction			
Removal of soil where foundations are constructed	Small	Low	Slight
Flooding events resulting in mobilisation of contaminative materials stored on site with impacts to soil and/or groundwater	Small	Low to Medium	Slight to Moderate
Impact to soils from fuel, lubricants, chemicals and cement slurry	Small	Low	Slight
Disturbance of canal sediments during dredging (if required)	Small	Low	Slight
During Operation			
Contaminated process discharges impacting soil	Negligible to Small	Low to Medium	Slight
Pollution events due to large releases of liquids	Negligible to Small	Low to Medium	Slight
Direct releases to the environment due to fire etc, including combustion products	Negligible to Small	Low to Medium	Slight
Release of fire-fighting water into drainage system	Negligible	Low to Medium	None to Slight
Ground Contamination (refer to Section 6.3.3)			
During Construction/Operation			
Leaching of contamination into surface waters	Small	Medium	Slight
Leaching of contamination into groundwater	Small	Medium	Slight
Existing Pipeline Infrastructure (refer to Section 6.3.4)			
During construction			
Damage to above and below ground services due to vehicle movements and construction activities	Small	Low	Slight
Damage to buried Shell ethylene pipeline during crossing construction	Negligible-Small	High	Moderate
Release of contamination during decommissioning of power station pipeline	Small	Low-Medium	Slight
Cumulative Impacts			
All proposed developments and allocations	Negligible or None	Various	Negligible

Table 6.7: Significance of Residual Impacts – Entire Site

Aspect	Magnitude	Receptor Sensitivity	Significance
Geology (refer to Section 6.3.1)			
During construction			
Excavation of superficial deposits and bedrock for foundation construction	Small	Low	Slight
Soils (refer to Section 6.3.2)			
During construction			
Removal of soil where foundations are constructed	Small-Medium	Low	Slight
Flooding events resulting in mobilisation of contaminative materials stored on site with impacts to soil and/or groundwater	Small	Low to Medium	Slight to Moderate
Impact to soils from fuel, lubricants, chemicals and cement slurry	Small	Low	Slight
Disturbance of canal sediments during dredging (if required)	Small	Low	Slight
During Operation			
Contaminated process discharges impacting soil	Negligible to Small	Low to Medium	Slight
Pollution events due to large releases of liquids	Negligible to Small	Low to Medium	Slight
Direct releases to the environment due to fire etc, including combustion products	Negligible to Small	Low to Medium	Slight
Release of fire-fighting water into drainage system	Negligible	Low to Medium	None to Slight
Ground Contamination (refer to Section 6.3.3)			
During Construction/Operation			
Leaching of contamination into surface waters	Small	Medium	Slight
Leaching of contamination into groundwater	Small	Medium	Slight
Existing Pipeline Infrastructure (refer to Section 6.3.4)			
During construction			
Damage to above and below ground services due to vehicle movements and construction activities	Small	Low	Slight
Damage to buried Shell ethylene pipeline during crossing construction	Negligible-Small	High	Moderate
Release of contamination during decommissioning of power station pipeline	Small	Low-Medium	Slight
Cumulative Impacts			
All proposed developments and allocations	Negligible or None	Various	Negligible

Notes:

Assessments of magnitude of impact based on the assumption that during normal operation, incidents are unlikely, but major incidents always have the potential occur infrequently.

The amount of throughput may impact significance, i.e. an increase in amounts of material processed would result in a higher likelihood of incidents occurring.

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