Report 2
Environmental Risk Assessment

SSQ BESPOKE MATERIALS RECYCLING FACILITY, LLANWERN

Report Number 2473r2v2d1224

Commissioned by

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1 INTRODUCTION

1.1 Background

Geotechnology has been commissioned by Darlow Lloyd and Sons Ltd (DLS) to prepare a bespoke Permit application for submission to Natural Resources Wales (NRW) for a proposed waste materials recycling facility located to the East of Newport at Llanwern. The area is referred to as South Side Queensway (SSQ) as it is to the south of the A4810 Queensway. The details of the application are summarised in Table 1-1 and the site location is shown on Figure 1-1.

Table 1-1 Application Details

Name of the Applicant	Darlow Lloyd and Sons Ltd (DLS)
Activity Address	Queensway, Newport. NP19 4QX
National Grid Reference	Area1_5: E336686 N186114 Area2_10:E336941 N186171 Area3_26: E337863 N185779

The proposals would enable DLS to receive and process waste on hardstanding to enable recovery and recycling. As part of the Permit application DLS is required to describe and assess the environmental risks posed by the proposals. The objective of this Environmental Risk Assessment (ERA) is to therefore assess the risks, if any, the proposed waste activities pose to the environment, human health or amenity issues of concern.

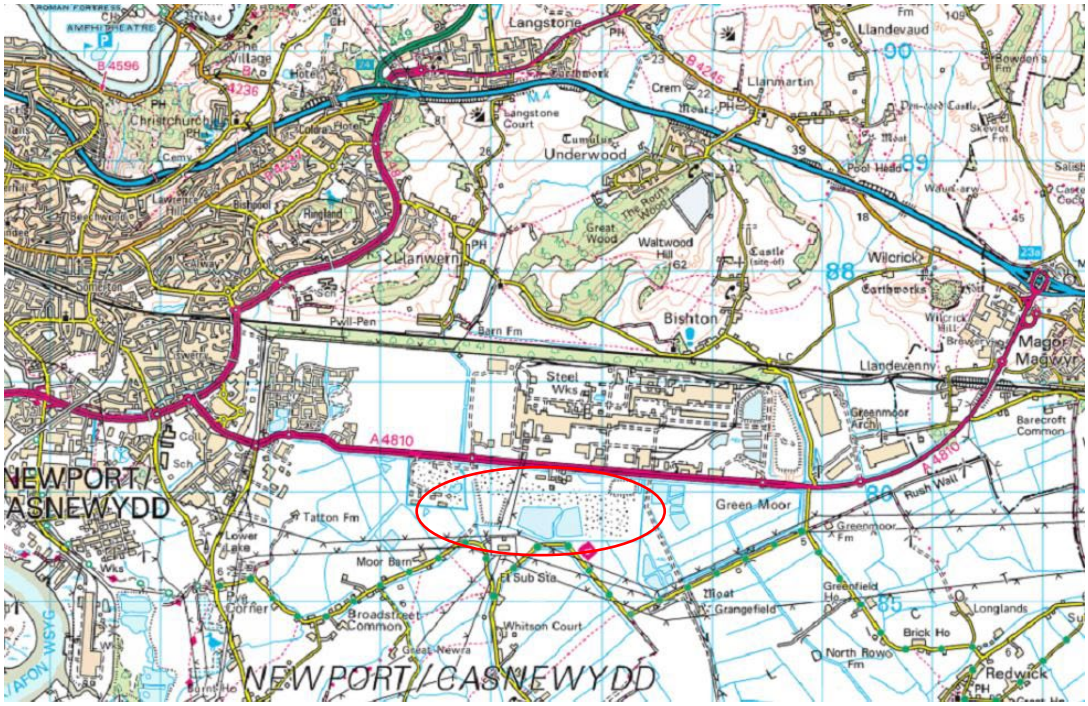


Figure 1-1 Position of SSQ east of Newport

1.2 Context of Proposed Activities

The potential environmental impacts associated with the proposals are described using a series of risk matrices, similar to those used by NRW for Standard Rules Permits and which form the cornerstone of ISO 14001 Environmental Management Systems. This latter approach is

particularly valid at this site as the proposed operations and pollution control measures are the same as those considered acceptable by NRW under a range of Standard Rules Permits underpinned by generic risk assessments and the facility would be operated in accordance with a documented management system aligned with ISO 14001. Within this context, the proposed activities could be considered conventional and the associated environmental risks familiar to NRW as they are the same as those proposed in several Standard Rules for materials recycling facilities.

2 PROPOSED ACTIVITIES

2.1 Responsibility

In accordance with RGN1, DLS will be the legal organisation with control over the waste process operation at SSQ with Tata Steel (UK) Ltd (Tata) being land owner. DLS will hold the Permit and operate the site in accordance with a written management system that identifies and minimises risk of pollution, including those arising from operations, maintenance, accidents, incidents, non-conformances, closure and those drawn to the attention of the operator because of complaints.

2.1 Acceptable Wastes

The proposed Bespoke Materials Recycling Facility will primarily process material already present in stockpiles across SSQ. However, DLS also wants the facility to accept listed wastes from the open market, primarily non-hazardous soils, as these are required by Tata for a number of landfill capping schemes at Llanwern.

Following processing of materials at SSQ, Tata and other third parties would utilise recovered aggregate, either for use within the steelworks or supplied to schemes outside the steelworks provided relevant Quality Protocols and Duty of Care are satisfied.

The SSQ facility will only accept the waste types listed in Table 2-1. DLS will operate a rigorous documented management system that includes waste acceptance procedures and Factory Production Control (FPC).

2.2 Treatment Areas

The whole SSQ area is already largely underlain by a hardstanding development platform of granular slag aggregate that was previously placed over the soft natural ground to facilitate the use of the land in accordance with a planning permission. To assist with management of the land holding, the SSQ area was historically split into different sub-areas with each given a unique name, as shown in Figure 2-1. The three areas to be Permitted are shown on Figure 2-2 outlined green in Stockyard 5 (Area 1_5), Stockyard 10 (Area 2-10) and in Lagoon 26 (Area 3_26).

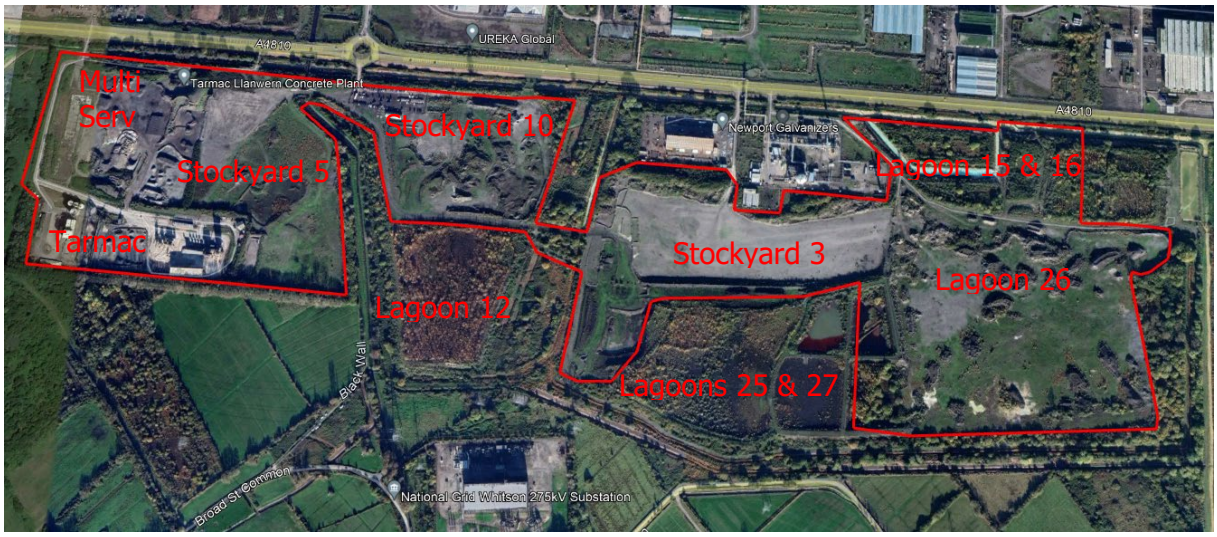


Figure 2-1 Annotated Site Plan of SSQ

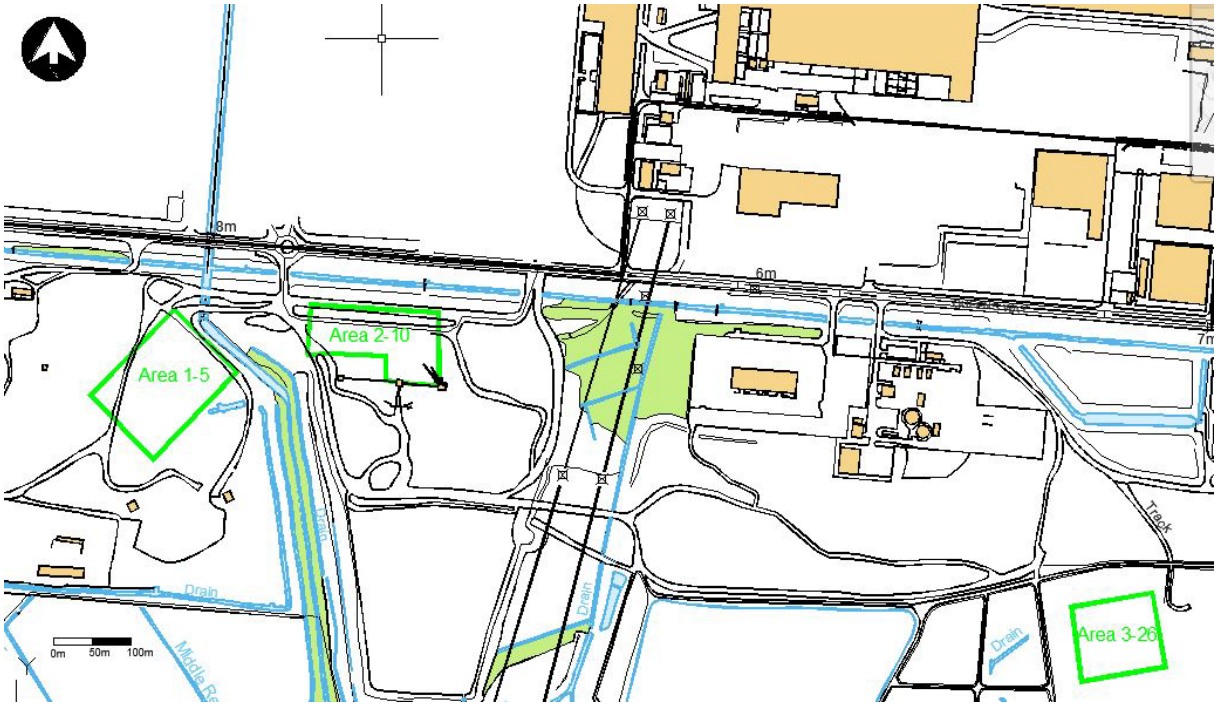


Figure 2-2 Permit Boundaries

Table 2-1 List of Wastes to be Accepted

EWC Code	Description of Wastes to be Accepted	EWC Entry Type
EXCLUSIONS Wastes having any of the following characteristics shall not be accepted: • Consisting solely or mainly of dusts, powders or loose fibres • Hazardous wastes • Wastes in liquid form		
01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 07 may include excavation from mineral workings	MN
01 04 09	Waste sand only	AN
10 11 03	Waste glass-based fibrous materials allowed only if: Wastes without organic binders	AN
15 01 07	Glass packaging	AN
17 01 01	Concrete (excluding concrete slurry)	MN
17 01 02	Bricks	MN
17 01 03	Tiles and ceramics	MN
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	MN
17 02 02	Glass (Must not include fibreglass or glass fibre)	MN
17 03 02	Bituminous mixtures	MN
17 05 04	Soil and stones other than those mentioned in 17 05 03 Must not contain any contaminated soil or stone from contaminated sites.	MN
17 05 06	Dredging spoil other than those mentioned in 17 05 05 allowed only if: Inert aggregate from dredgings. Must not contain contaminated dredgings. Must not contain fines.	MN
17 05 08	Track ballast other than those mentioned in 17 05 07	MN
17 09 04	Mixed construction and demolition waste comprising granular material	MN
19 12 05	Glass Does not include glass from cathode ray tubes.	AN
19 12 09	Minerals (for example sand, stones)	AN
20 01 02	Glass Must not include fibreglass.	AN
20 02 02	Garden and park wastes (including cemetery waste) – soil and stones Must not contain contaminated stones from garden and parks waste.	AN
16 11 04	Refractory	MN
10 02 01	Waste from the processing of blast furnace slag / steel slag	AN
10 02 02	Unprocessed blast furnace slag / steel slag	AN
10 02 99	Slab yard refuse	AN
10 12 08	waste ceramics, bricks, tiles and construction products (after thermal processing)	AN
10 13 14	Waste concrete only	

The on-site materials to be processed are currently spread in stockpiles across SSQ, a site measuring ~2000m x 500m (100Ha). Given the large size of the landholding, the areal extent of the material to be processed and the need for Tata to lease the land as soon as materials are processed and areas cleared, a phased approach is to be adopted. The works are to progress from west to east over a period of about 10 years, commencing in Stockyard 5 and then moving through to Stockyard 10 and then finally to Lagoon 26; incidentally, this latter area currently benefits from a Permit for its use as a non-hazardous landfill although the landfill has never been developed. The fact that it was permitted does, however, reflect the environmental setting of the area.

To enable land to be progressively leased following processing and to minimise haul distances and disturbance, 3 processing areas will be temporarily and sequentially used. Each of these areas are identified on Figure 2-1 as the green polygons with Stage 1 being in Stockyard 5, Stage 2 in Stockyard 10 and Stage 3 in Lagoon 26.

Each area would be used for approximately 2-3 years, surrendered and then the mobile plant moved to the next area of the site. On this basis, the bespoke Permit boundary is each of the areas shown on Figure 2-1 and the Permit is sought for 10 years to provide time for surrender and plant movement.

Each area would allow waste would to be processed within a defined area with strict pollution control measures as would be expected of any fixed position facility or mobile treatment plant.

The treatment areas are referred to as Area 1_5, Area 2_10 and Area 3_26 to signify their sequential use and the areas of the site where they will be located i.e. the first area will be in Stockyard 5, the second in Stockyard 10 and the third in Lagoon 26.

If market forces demanded access to the land available at SSQ sooner than currently anticipated, then more than one area would operate at the same time.

2.3 Operating Techniques

Stockpiles of various wastes from steelmaking have been in place at SSQ for many years. To reduce and remove risks to land quality and controlled waters, Tata seeks to remove contaminants and unsuitable materials that pose risk to the environment and recover waste, where feasible. The aim of the proposed works by DLS is to therefore process waste stockpiles and bunds enabling brownfield land to be brought into the development cycle.

From experience of processing similar wastes elsewhere and based on investigations and assessments, Tata has found that the main contaminants identified to date include:

- metals
- a physically fine fraction (silts and sands) that occupies the matrix in predominantly granular waste. This fraction is strongly alkaline and volumetrically expansive and needs to be removed and separated to remove leachable source and enable granular waste to be recovered.
- a wide range of anthropogenic materials that are co-mingled with the waste and include timber, refractory bricks, plastic, preventing re-use and recovery.

Following review of operations where DLS process the same waste for Tata at other sites and consideration of project goals, DLS has identified that the following remedial technologies will prove successful and enable materials recovery

- washing – as some of the materials contain a fine fraction, washing will allow these contaminants to be separated and removed. During this process, the fine silts and sands will be density separated from the light fraction contaminants such as timber and plastic enabling a feedstock of alkaline cementitious materials to be generated that will be used in stabilisation and solidification remedial interventions elsewhere at Llanwern.
- Screening, crushing, blending and separation

All treatment areas will operate using the same techniques and mobile plant apart from the use of an aggregate wash in Area 2_10. The plant to be used in each area is summarised in Table 2-2 with Manufacturers Specification provided in Appendix 1.

Table 2-2 Plant to be used in Permitted areas

Item	Area 1_5	Area 2_10	Area 3_26	Plant Imagery
1 no. McCloskey screen	Y	Y	Y	
1 no. Loading shovel CAT 966	Y	Y	Y	
1 no. Excavator Cat 320	Y	Y	Y	
1 no. Trio aggregate wash plant		Y		

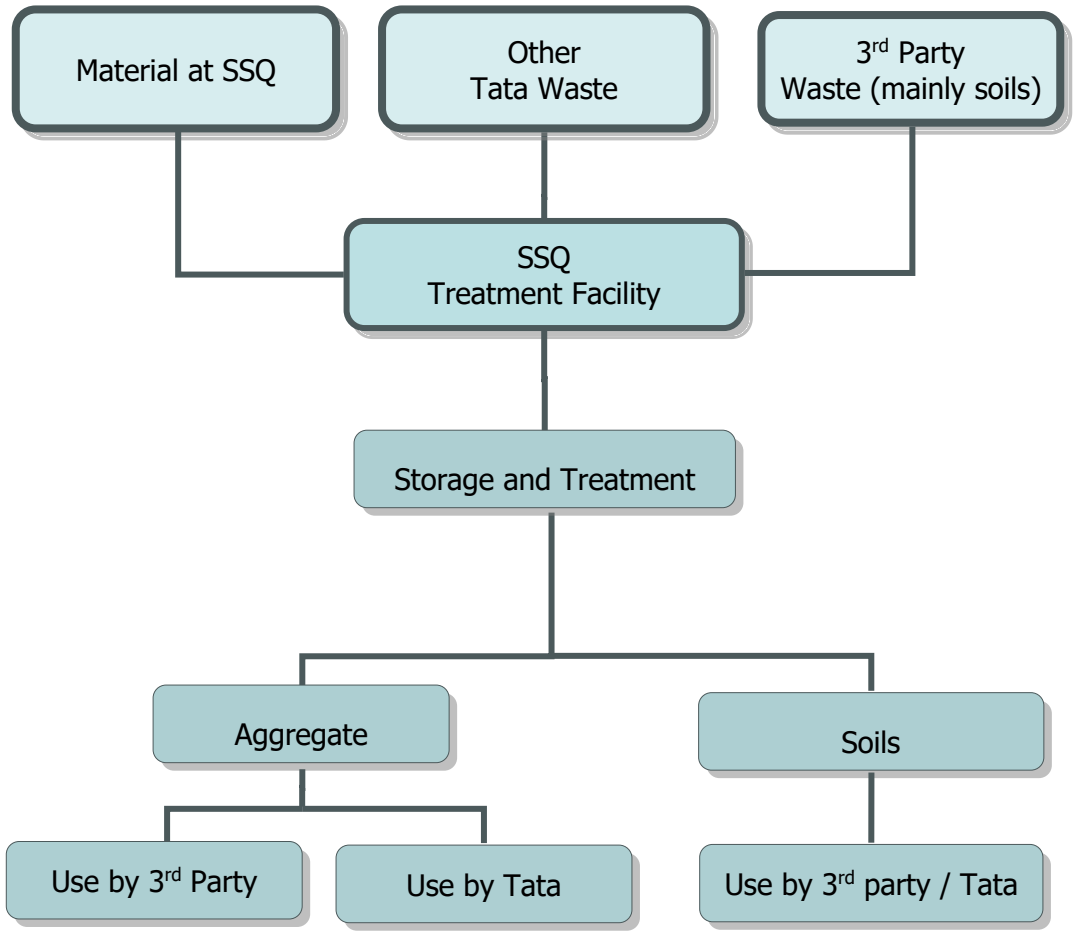
In each area, the waste will be temporarily stored and processed according to the techniques summarised in Table 2-3. In the second column of Table 2-3 are the process limitations.

Table 2-3 Proposed Waste Processing Activities

Proposed Recovery and Disposal Codes applicable at the Site	Indicative Description of Proposed Activities
R13: Storage of wastes pending the operations numbered R3 and R5. **R3:** Recycling or reclamation of organic substances which are not used as solvents. **R4:** Recycling/reclamation of metals and metal compounds **R5:** Recycling or reclamation of other inorganic materials.	Treatment of listed wastes consisting only of sorting, separation, screening, crushing and blending of waste for recovery as a soil, soil substitute or aggregate. Washing of selected waste will occur in Area 2_10. Secure storage of listed wastes pending treatment. Storage of wastes shall not exceed 150,000 tonnes in total at any one time. No more than 300,000 tonnes of waste shall be treated per year. Where disposal is required, this will be undertaken in accordance with Duty of Care and legal requirements.

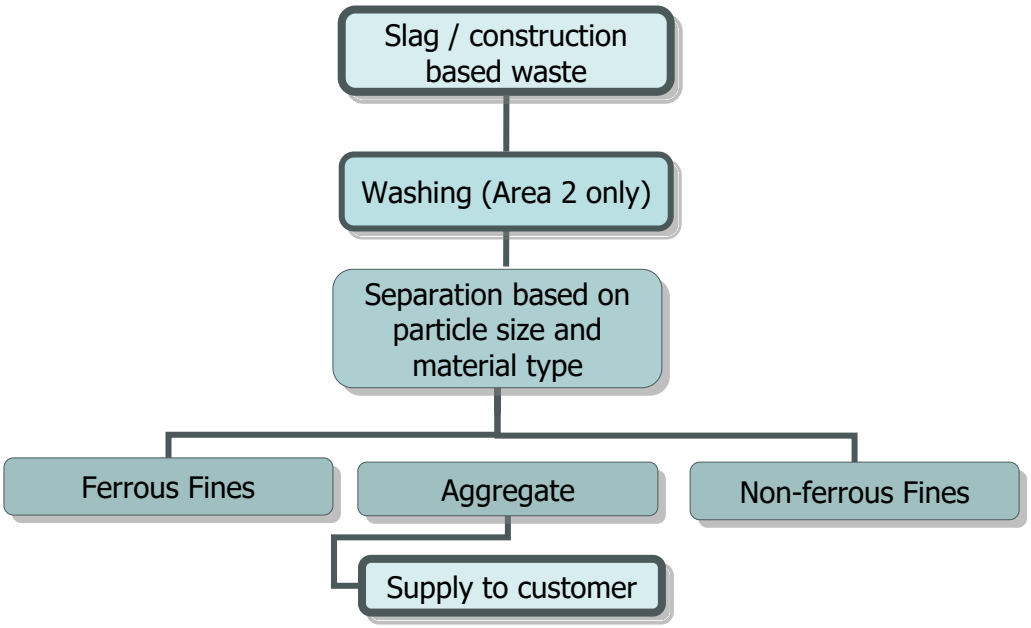
A process flow chart summarising the proposed activities that would occur in each area is provided in Flowchart 2-1.

Flowchart 2-1 Overall flow of materials in each processing area

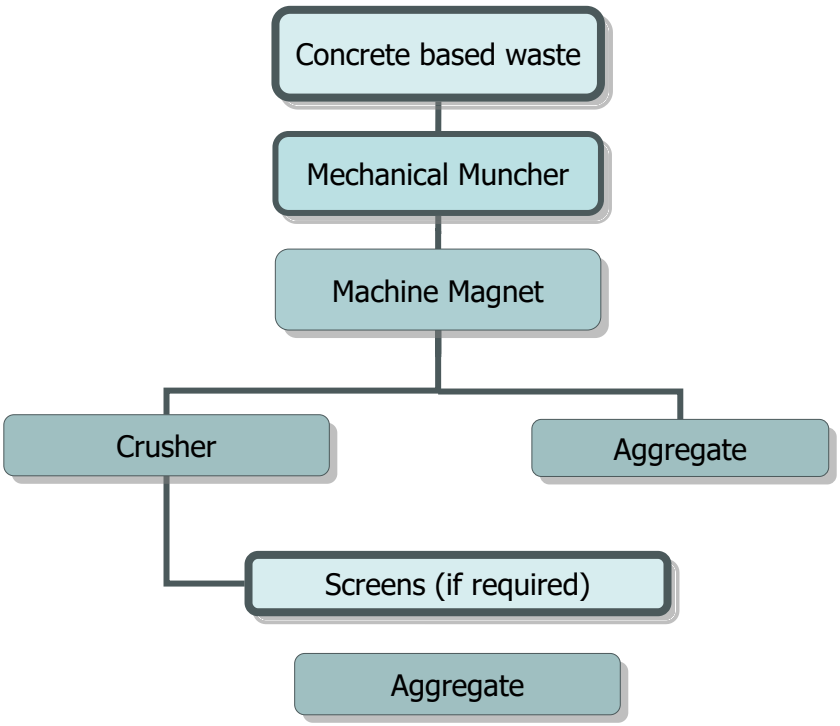


In each area, treatment will utilise the conventional plant to separate, screen and crush the wastes, where required, to produce aggregates and soils comprising different particle sizes. The overall process for slag-based wastes and concrete/mixed demolition based wastes is provided in the two process flow diagrams provided in Flowcharts 2-2 and 2-3. Some materials may simply need to be screened.

Flowchart 2-2 Typical Processing of Slag and suitable construction based waste



Flowchart 2-3 Typical Processing of Concrete Based Waste



Screening and crushing will involve the use of the proprietary mobile plant supported by front loading shovels and 20T excavators. The set-up of the screen and crusher creates a number of processing options with respect to the process flowcharts. This is because the screen and crusher allow variable sized material to be produced depending upon the jaw dimension and screen sizes used. This process is partly dependent on the input oversize materials but also on customer requirements. Materials such as heavily reinforced concrete may also sometimes require reprocessing to achieve the final aggregate grading.

2.3.1 Washing

Washing of materials will enable fines and light fraction contraries to be separated from the aggregate. This will be achieved in a closed loop integrated log washer in Area 2_10. Process wash water will be taken from the on-site Tata effluent drainage system. This water is already strongly alkaline but will provide a medium for separating the fine particles from the coarser granular material.

As shown on Figures 2-3 and 2-4, all of the former waste management area of SSQ, which is the area east of Monk's Ditch, is ringed by a double cut-off ditch system. This comprises an inner "dirty" cut-off ditch that forms part of the Surface Water Treatment System.

The dirty ditch returns water back to the Main East-West Ditch (MEWD) which is constructed 25m south of Queensway and which runs parallel to that road. Flow in the MEWD collects towards the outfall ditch on the eastern edge of SSQ and is diverted into Lagoon 14, which is the main settlement lagoon in the surface water treatment system. Water from Lagoon 14 discharges back into the outfall ditch where it flows south for 1km until it reaches the Stormwater Pumphouse. The Stormwater Pumphouse then transfers the water along a 2.6km long pipeline to the discharge point in the Bristol Channel, as shown in Figure 2-5. The clean ditch links directly to the outfall ditch 600m north of the Stormwater Pumphouse. The surface water treatment system discharges to the Bristol Channel via the pumphouse and then a 2.6km pipeline. Current pumping volumes are understood to be in the order of 20Mm^3 of water per annum with the discharge regulated by NRW under the Tata Permit.

As the MEWD runs west to east just to the north of Area 2_10, water will be abstracted for use in the wash plant. Each week, the wash water will be collected by tanker for off-site disposal by GD Environmental. This will ensure that all water is retained within the plant until no longer needed and then collected by an appropriate waste carrier to a local liquid disposal facility, most likely Tradebe.

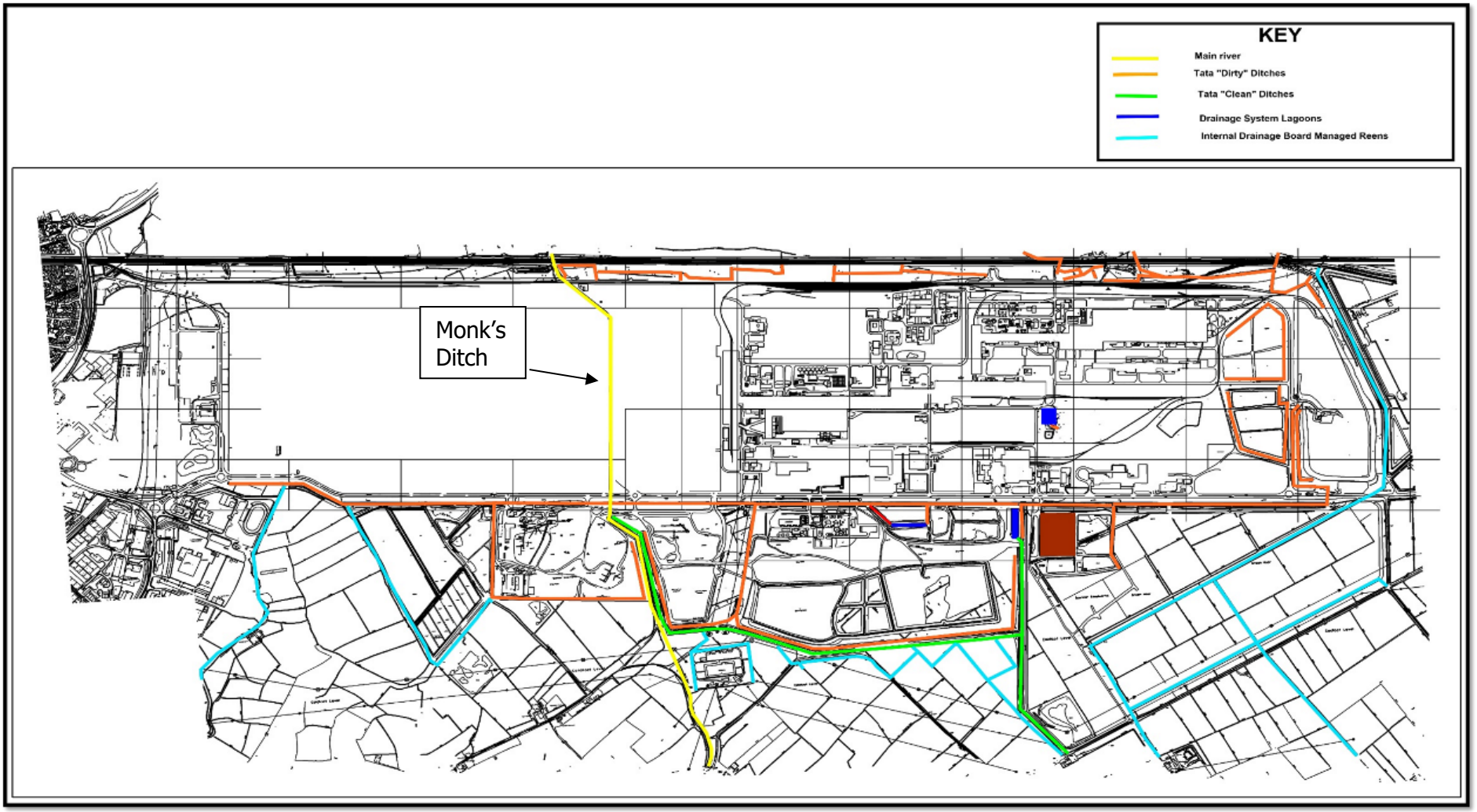


Figure 2-3 Map of part of Tata's surface water drainage system showing the Inner and Outer Cut-off Ditches surrounding SSQ with the Outfall Drainage Ditch on the right side leading to the Stormwater Pumphouse

Figure 2-4 Drainage network surrounding SSQ
(orange – inner dirty ditch, dark blue – outer clean ditch, light blue – MEWD that drains to pumping station)

Figure 2-5 Surface water drainage system showing the Stormwater Pumphouse and Outfall Pipeline

2.3.2 Production of Aggregates

DLS intends to produce aggregates i.e. granular materials, in accordance with the Quality Protocols. This includes the *WRAP Quality Protocol for the Production of Aggregates from Inert Waste and the Steel Slag Protocol.* The aggregates will primarily be used in construction, either on-site by Tata or off-site by a third party. For the avoidance of doubt, clays and soils are not considered to be aggregates and so will not be subject to the Quality Protocol. The production of aggregate will be subject to Factory Production Control (FPC).

The production of aggregates will involve size reduction and sorting, where necessary, of the acceptable wastes to produce aggregates that meet the Standards and Specifications set out in the Quality Protocols. Some materials may not require processing to meet the Standards and Specifications or the requirements of customers holding relevant Permits, Exemptions of Cl:aire Code of Practice declarations.

The precise range of aggregates will be dependent upon demand and will be controlled by altering the way in which the waste is processed. To demonstrate that aggregate has been produced, a rigorous testing regime will be in place in accordance with the requirements of the protocol.

The processing of the material will primarily involve screening and crushing coupled with an over band magnet to remove ferrous metals. An eddy current separator may also be used to selectively remove non-ferrous components.

In accordance with the site management system, all plant will be subject to a proactive preventative maintenance plan. The plant will be fitted with integral dust and noise suppression in accordance with prevailing Health and Safety requirements.

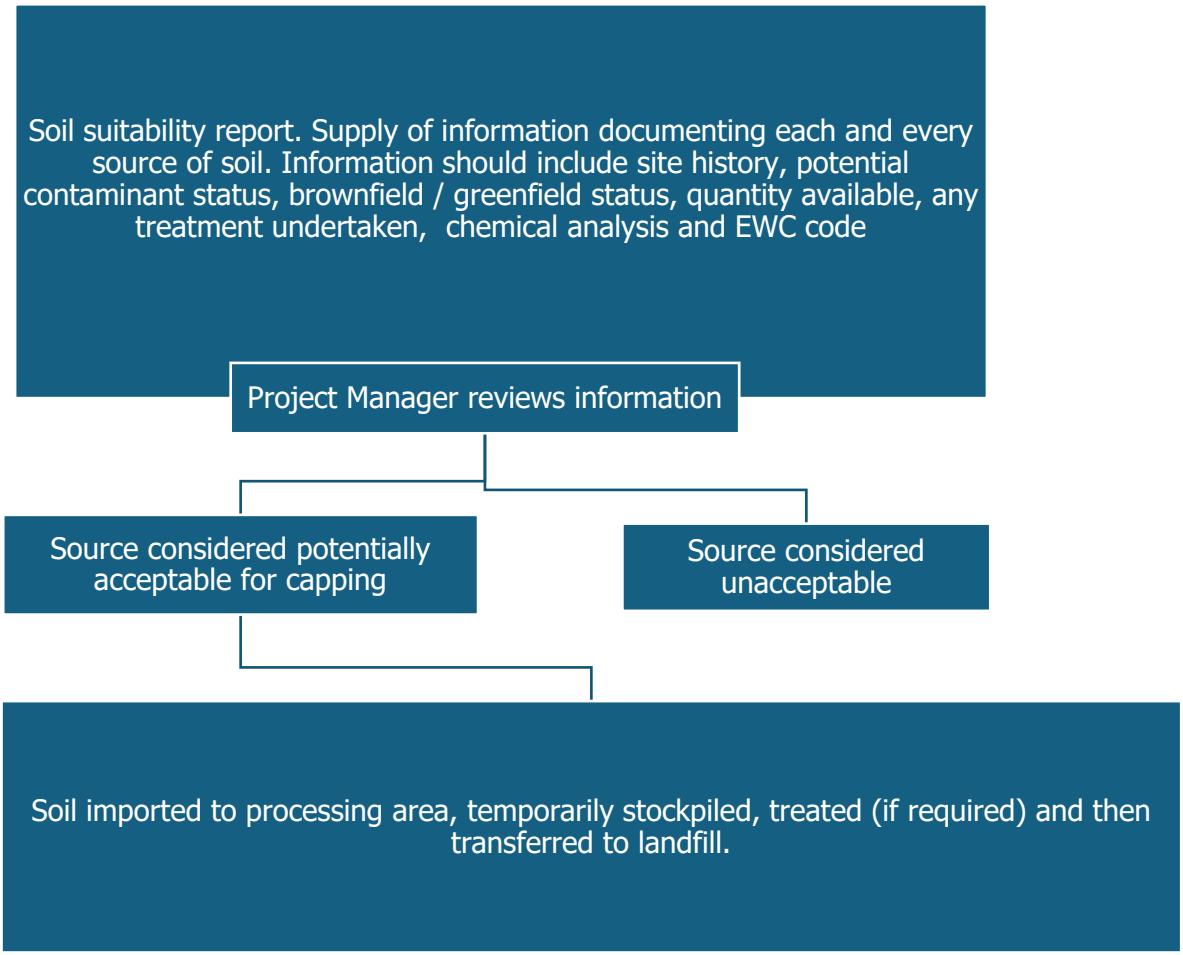
Following the processing under FPC, virtually all ferrous metal will have been recovered from the waste and a series of size graded stockpiles of aggregate will be available for use.

2.3.3 Cohesive Material

At Llanwern, Tata has started capping East Waste Management Site (EWMS) landfill which is located on the northern side of Queensway at the far eastern end of the works. To complete the capping a further ~100,000m^3 of soil is required to provide a durable and sustainable restoration surface above the capping systems. Similarly, at SSQ, Construction Quality Assurance (CQA) plans for the restoration and closure of Lagoons 25 and 27 respectively are being reviewed and updated (having previously been submitted to NRW) and these schemes require some 100,000 m^3 of capping soil. As a consequence, there is a high demand for large volumes of soil in the immediate vicinity.

As part of this bespoke Permit, candidate soils will be accepted, processed (if required), temporarily stored and then transferred to storage areas directly adjacent to the landfills to be capped. Processing will involve sorting and separating as candidate soil sources will be carefully vetted and only once they meet the soil chemistry required by each capping scheme will they be accepted. This process is summarised in Flowchart 2-4.

Flowchart 2-4 Soil importation process overview



2.3.4 Metal Separation and Recovery

During the production of aggregates, small amounts of ferrous metals will be removed by magnets built into the screens/shredders. The metal will be temporarily stockpiled before transferred for recovery off-site.

2.4 Waste Quantities

DLS wishes to process up to 300,000 tonnes/year at the SSQ facility. The waste streams will be dominated by steel slag.

2.5 Surrender

As each area is to be sequentially used, a basic surrender process will be followed once the activity in one area has been completed. This will involve:

- Removal of all mobile plant
- Comparison of photographs taken before and after the area was used
- Comparison of ground conditions – in some areas it is anticipated that ground levels will change as some of the material requiring processing is in-situ. At surrender this will need to be taken into account.
- Comparison of land quality – as part of the application process, each area has been investigated, photographs taken and samples collected for analysis. This site condition information will be updated at surrender with a repeat site investigation.

2.6 Security, Access and Egress

Access is directly off the A4810 running along the northern boundary of the site. At the end of each day site will be locked and secured.

At present, the site benefits from unrestricted vehicular access to the site (i.e. in terms of the site being accessed at any time of the day/night, by any category of vehicle). However, under normal operations the site will operate between 07:00 and 16:30 and deliveries will be restricted to occur between these times. The site will not accept waste or operate outside of these hours.

SSQ is ultimately within the land holding of Tata and subject to 24hr security.

2.7 Site Infrastructure and Layout

Each of the sites benefit from a stable and durable hardstanding comprising a slag development platform that provides a hard surface upon which to operate. The platform prevents pooling of surface water and rutting and is capable of being kept clear of debris.

Upon entry to the site each vehicle will pass over a weighbridge for weighing before being directed to the relevant reception area for unloading. Following unloading, vehicles may pass over a wheel wash. Both of these features are shown in Plates 2-1 and 2-2.

Plate 2-1 Mobile weighbridge

Plate 2-2 Mobile wheel wash

In each of the processing areas, the site layout will essentially be the same and use the same mobile plant.

2.8 Drainage

The natural strata below and near the site is considered by Natural Resources Wales (NRW) as a non-aquifer due to the extremely low permeability. The environmental setting is such that Tata has been granted permission for a Non-Hazardous Landfill at SSQ, in Lagoon 26, although landfill development has never commenced.

Almost all the annual recharge falling on the hardstanding treatment areas will ultimately leave SSQ as surface water after first slowly infiltrating through the development hardstanding to the upper surface of the low permeability upper clay. Such seepage will eventually migrate to one of the surface water ditches excavated into the low permeability clay that fully encapsulate SSQ and prevent any direct run-off from entering the wider environment, as shown in Figure 2-2. This system comprises the Tata Surface Water Treatment System.

Following treatment, the surface water is discharged to the sea via a pumped pipeline that operates under Tata's environmental permit. As a consequence, each treatment area benefits from a managed and regulated drainage system that serves the whole of SSQ that has been proven to be effective for many years. As the waste to be processed in each treatment area is largely already present at SSQ there is essentially little change to the overall drainage requiring management.

In this context, the ditches have chemical and biological characteristics substantially different from the controlled watercourses in the SSSI. Of particular note is that the pH is permitted to be as high as 12 at the compliance point, but at certain times of the year in some locations the pH can rise to around 13 which is very strongly alkaline. The ditches also quickly accumulate sediment, mainly in the form of secondary precipitates including calcium carbonate which is why routine maintenance is essential to performance.

2.9 Technical Ability

DLS recognises that to operate under a Permit, trained and competent staff are required. On this basis, Mr James Davis will be the TCM as he holds the appropriate WAMITAB certification as shown by certificates in Appendix 2.

2.10 Management Systems and Toolkit

DLS will operate each area in accordance with the 'How to comply' guidance suite and will continually review the site Environmental Management System and procedures to ensure the operation in each area is based on sound current environmental practice. Most importantly, this Environmental Risk Assessment will be routinely reviewed to ensure the predictions are valid, control measures are adequate and current and the environment remains protected.

3 ENVIRONMENTAL SETTING

Having detailed the proposed activity this section details the site setting so that the sensitivity of the site can be understood and receptors identified. All of this information is subsequently evaluated as part of the risk assessment.

The following sections summarise several key aspects identified in the desk study information. The reader is encouraged to also digest the Envirocheck report and other information related to land quality in the separate Site Condition Report as this provides additional background and detail, only some of which is considered further below.

3.1 History

The different areas forming part of the wider land ownership of Tata to the south of Queensway are identified on Figure 3-1.

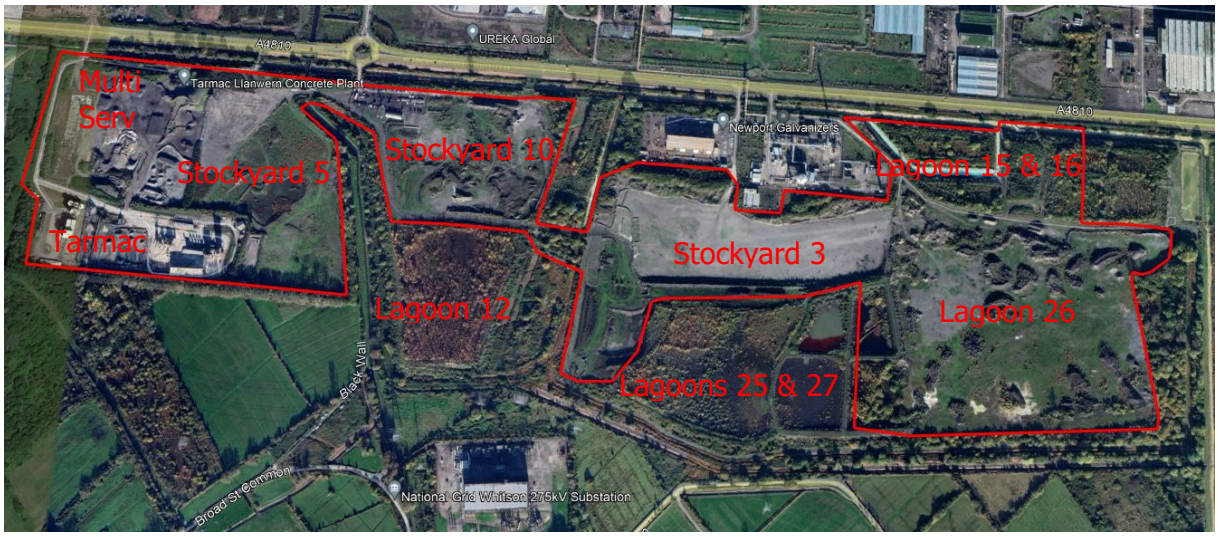


Figure 3-1 Annotated Site Plan

Prior to the construction of the Works in the early 1960s, the land and surrounding area was farmland, having been reclaimed from the sea by the construction of sea walls in the middle ages.

Prior to placement of a slag aggregate hardstanding, the ground surface comprised poorly drained pasture land dissected by a number of shallow ditches which were part of the reen system of the Gwent levels. Utilisation of the area was initially confined to the western part and the gases manufacturing plant (the current Wedge Group Galvanising Plant). However, the utilisation expanded over the years and saw the construction of a bunded landfill for ferruginous sludges created in 1979 at Lagoon 12 and then expansion on the east. In 2004, part of the BOC works was converted to become a commercial galvanising plant which also provides services to the works.

The key feature of relevance from an environmental perspective is the disruption to the historic drainage pattern and the placement and processing of slag across the site. However, prior to the late 1950s the site was agricultural land with no significant potential contaminating activities that could influence the proposed site use, and prior to the late 1980s was not used for steelworks related activities.

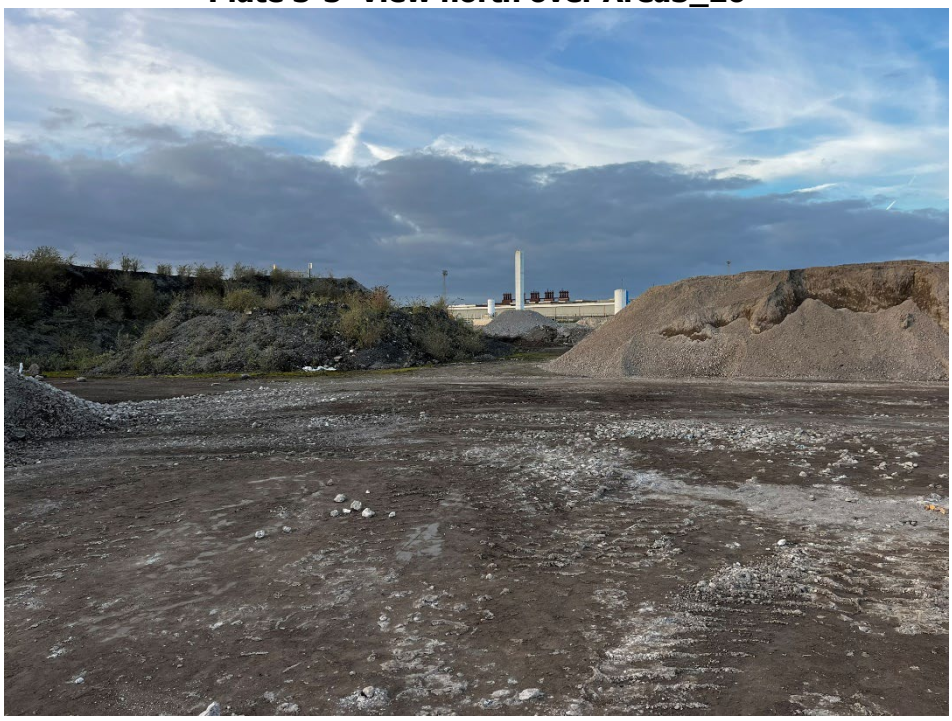
3.2 Current Topography

The current topography of each area is characterised by widen open spaces of level ground that is covered with numerous stockpile of various size and orientation. Recent photographs of the site are provided in Plates 3-1 to 3-3.

Plate 3-1 View North over Area1_5

Plate 3-2 View north over Area 2_10

Plate 3-3 View north over Area3_26



3.3 Ground Conditions

In summary, the following sequence of strata is consistently present across SSQ:

Strata	Thickness(m)
Infilled Ground – Slag	0.30 – 3.00
Estuarine Alluvium – Upper Marine Clay	3.10 – 7.00
Estuarine Alluvium – Peat	1.00 – 2.00
Estuarine Alluvium – Lower Marine Clay	1.00 – 4.10
Triassic Bedrock	>5.20

One of the key observations from the site investigations across SSQ is the consistency of both the infilled ground and the underlying natural strata. This is because only a limited number of steelmaking materials were used in the construction of SSQ, mainly slag, and the consistent low-lying setting of the site. The consistent geology is shown in the mapping included in the Envirocheck report.

3.4 Current Land Quality

The land quality in each area has been investigated. The full results of these investigations are presented in the Site Condition Report that will be maintained during the lifetime of the Permit and used to inform Surrender. Typical ground conditions encountered in each of the three areas are shown in Plates 3-1 to 3-3.

Plate 3-4 Typical ground conditions at Area 1_5

Plate 3-5 Typical ground conditions in Area 2_10

Plate 3-6 Typical ground conditions in Area 3_26

In Table 3-2, the maximum values encountered from the investigations are presented alongside Generic Assessment Criteria (GAC) for a commercial land use. The comparison indicates:

- no asbestos fragments or fibres have been detected
- the concentration of all trace metals analysed are low and below the commercial GAC
- petroleum hydrocarbons are either not detectable or at low concentrations well below the commercial GACs

In combination, the data and investigation of ground conditions indicate that the near surface materials are mineral with no significant biodegradable or volatile components present. With all parameters detected falling below the commercial GACs, the data suggests that the near surface materials do not pose a risk to human health and the lack of a biodegradable component indicates no viable significant ground gas source.

Table 3-1 Trace Metals detected in near surface slag materials

Parameter	Units	Commercial GAC	Maximum (18 samples)
Chromium VI	mg/kg	49	1.31
Chromium III	mg/kg	8600	791
Arsenic	mg/kg	640	19.6
Cadmium	mg/kg	410	2.07
Copper	mg/kg	68000	111
Lead	mg/kg	2300	672
Elemental mercury	mg/kg	58	<1
Nickel	mg/kg	980	57
Selenium	mg/kg	12000	22.5
Zinc	mg/kg	730000	1750

Table 3-2 Speciated Hydrocarbons detected in near surface slag materials

Parameter	Units	Commercial GAC	Maximum (18 samples)
Naphthalene	µg/kg	190000	80.9
Acenaphthylene	µg/kg	83000000	46.9
Acenaphthene	µg/kg	84000000	54.4
Fluorene	µg/kg	63000000	31.5
Phenanthrene	µg/kg	22000000	413
Anthracene	µg/kg	520000000	93.4
Fluoranthene	µg/kg	23000000	1290
Pyrene	µg/kg	54000000	1240
Benz(a)anthracene	µg/kg	170000	847
Chrysene	µg/kg	350000	988
Benzo(b)fluoranthene	µg/kg	44000	1570
Benzo(k)fluoranthene	µg/kg	1200000	573
Benzo(a)pyrene	µg/kg	77000	963
Indeno(123cd)pyrene	µg/kg	500000	893
Dibenzo(ah)anthracene	µg/kg	3500	147
Benzo(ghi)perylene	µg/kg	3900000	836

3.5 Hydrogeology

3.5.1 Aquifer Characteristics

The strata below and near the site is considered by NRW as a non-aquifer (as shown on the Envirocheck Vulnerability Maps). Both the Holocene sediments and the underlying Mercia Mudstone are of low to extremely low permeability, which supports their classification of the area as a Non-Aquifer. There is no known licensed or unlicensed groundwater abstraction from strata underlying the Caldicot Levels. As shown by the classification maps presented in the Envirocheck report the site is located in an area considered to be of low vulnerability due to the combination of a Secondary B Aquifer overlain by non-productive strata.

The absence of any groundwater abstractions from this hydrogeological setting, in an area where mains supply requires significant investment in infrastructure, supports the assertion that groundwater is not a viable resource in this low permeability setting. The site is located in an area of low groundwater vulnerability.

3.6 Hydrology

There are no surface water features in any of the areas to be Permitted.

There are two primary watercourses present in the area, the Hundred Perches Reen and Monks' Ditch. Both are classified as Main Rivers, which means that they fall under the responsibility of Natural Resources Wales (NRW). Smaller watercourses include Oxleaze Reen that is located directly north of the South Wales main railway line.

The Hundred Perches Reen flows from north to south along the far eastern boundary of the steelworks and into Middle Road Reen which discharges to the estuary by way of Elver Pill Reen and Windmill Reen. This reen is over 1km east of the site. The Monks' Ditch flows from

north to south approximately 350m west of the Westland site, along the eastern edge of Stockyard 5. Both watercourses ultimately discharge into the Severn Estuary, which lies approximately 4km to the south.

The network of ditches and reens immediately surrounding the site are shown on Figure 3-2. These form part of the Gwent Levels which comprises an extensive low-lying area of estuarine alluvium located on the north side of the Severn Estuary between Cardiff and the River Rhymney in the west and Chepstow on the River Wye in the east. The presence of these ditches reflects the very low permeability of the upper clay.

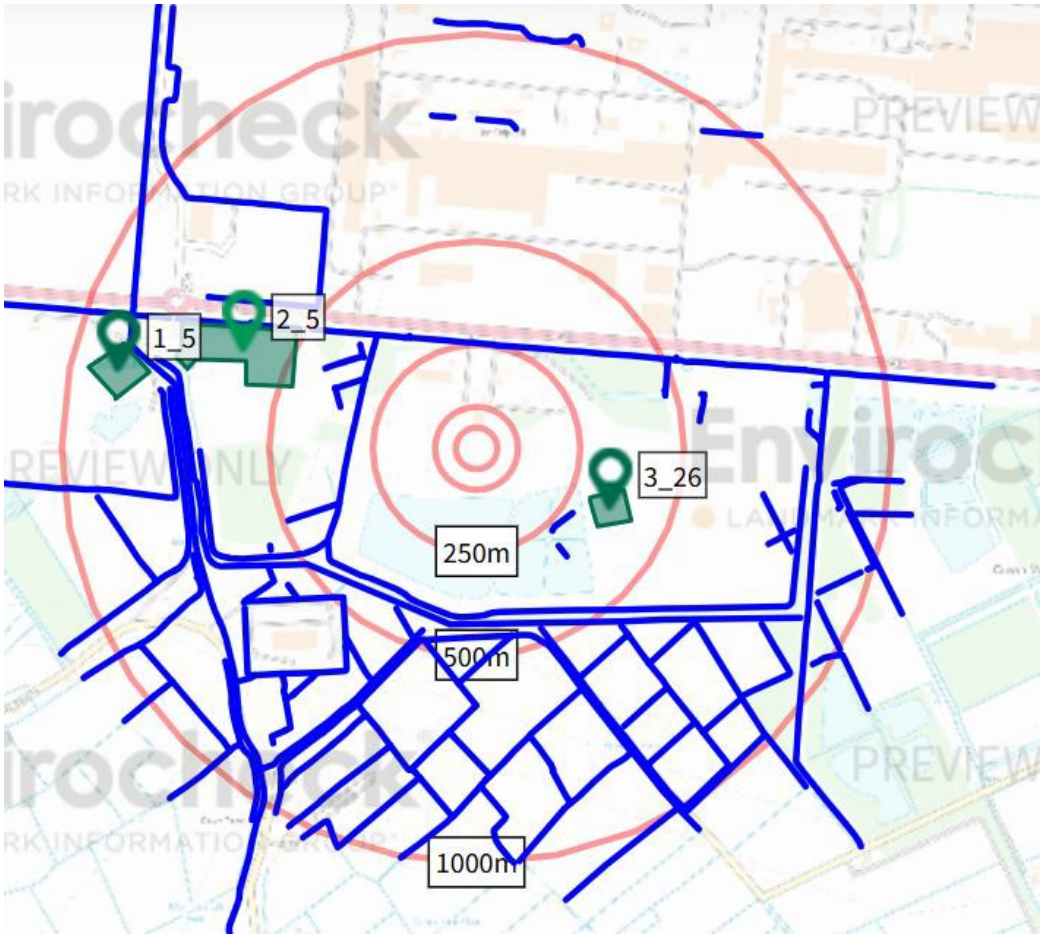


Figure 3-2 Surface water features around each site

Almost all the annual recharge falling on the SSQ site and surrounding Gwent Levels leaves via surface runoff due to the low permeability nature of upper clay soils and the underlying low permeability Holocene sediments.

On site, infiltration falling on the hardstanding to be used for storage and processing in each of the areas will ultimately be captured into the same network of ditches but will first infiltrate through the slag development platform and slowly migrate along the upper surface of the upper clay. Such seepage will eventually migrate to one of the surface water ditches excavated into the low permeability upper clay that encompass SSQ. These ditches are designed to capture and divert such drainage to the Tata surface water treatment area, preventing escape to the wider environment.

As all of the drainage ditches surrounding SSQ are incised into the underlying low permeability alluvial clays they provide a protective barrier against the migration of potential contaminants from SSQ to the sensitive Site of Special Scientific Interest (SSSI) features to the South. The whole system is managed under Tata's environmental permit with routine maintenance including dredging and vegetation clearance as shown in Plate 3-7.

Plate 3-7 Ongoing clearance of inner ditch south of Lagoon 25 (12 November 2024)

3.7 Flood Potential

According to the mapping provided in the Envirocheck report parts of the site appear to be at risk of flooding.

3.8 Pollution Incidents

According to the Envirocheck report there are no recorded pollution incidents to surface water at the site or in the surrounding area.

3.9 Mining

The site is not in an area influenced by mining.

3.10 Ground Instability

The placement of the slag aggregate hardstanding has allowed the site to be used for commercial purposes for several decades and no natural ground is currently present at ground surface within the site.

3.11 Environmental Sensitivity

The SSQ and the three sites lie adjacent to the Whitson Site of Special Scientific Interest (SSSI) and Nash And Goldcliff SSSI, notified in 1988 and 1987 respectively. These two SSSI's form part of a series between Chepstow and Cardiff, the whole area being referred to as the Gwent Levels. These two SSSI's were designated because they form part of an extensive reen system now rare within Wales which supports a rich assemblage of plants and animals. This is principally due to the variety of reen types and differing management regimes. The position of the SSSI relative to the three areas is shown in Figure 3-3.

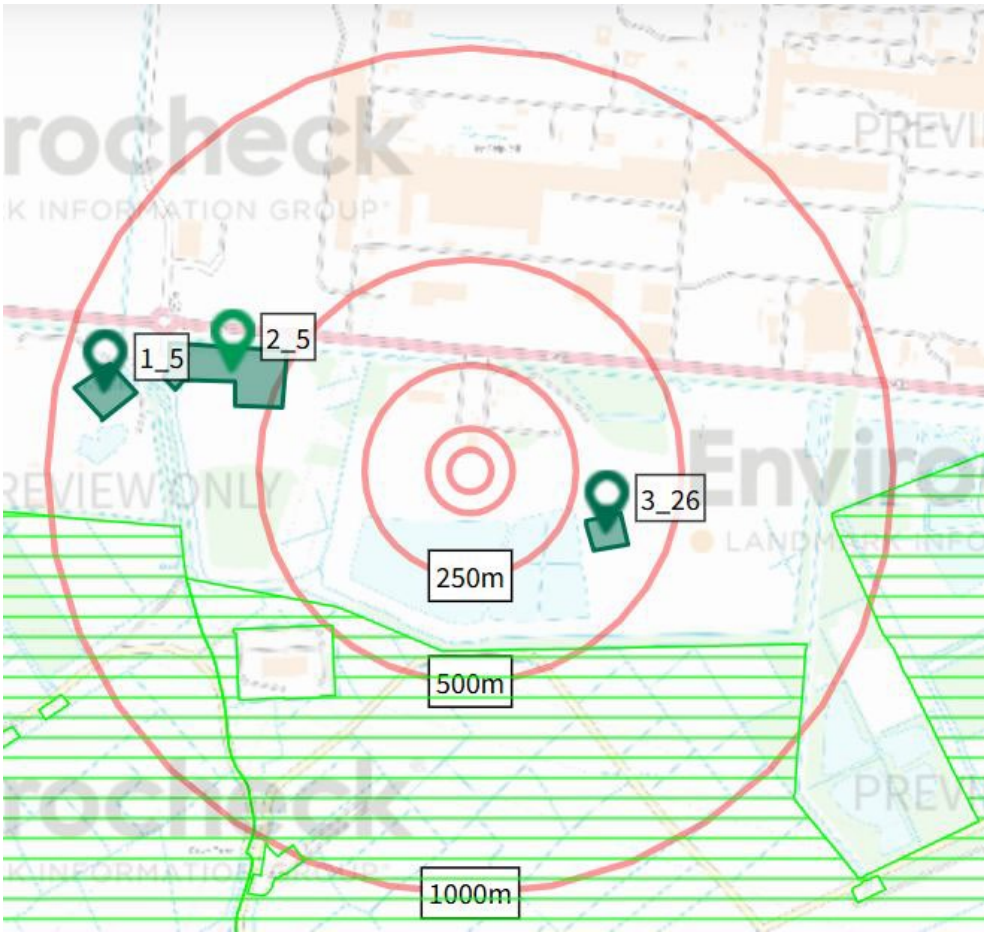


Figure 3-3 Position of SSSI (horizontal green line) relative to processing areas

The importance of these SSSI is enhanced by their proximity to the Severn Estuary which is also a protected area.

According to the Envirocheck report there are no other designated sites in proximity to the site. However, a Site of Importance for Nature Conservation (SINC), known as Spencer Works

3, was previously identified in the southeastern corner of SSQ. At this stage, it appears that this site is no longer designated as a SINC as it is not listed on the Newport Council website. As this area is no longer marshy grassland this may have resulted in its removal from the list of SINCs. Such SINC designations do not prevent developments, where there are no adverse impacts on the features for which a site is designated and on wider ecosystem resilience. Where harm is unavoidable it should be minimised by mitigation measures and offset as far as possible by compensation measures.

3.11.1 Ancient Woodland

There is no ancient woodland in close proximity to the site.

3.12 Residential Properties

As shown on Figure 3-4, the SSQ area is remote and not directly connected to any residential areas. The closest properties are located approximately 700m southwest.

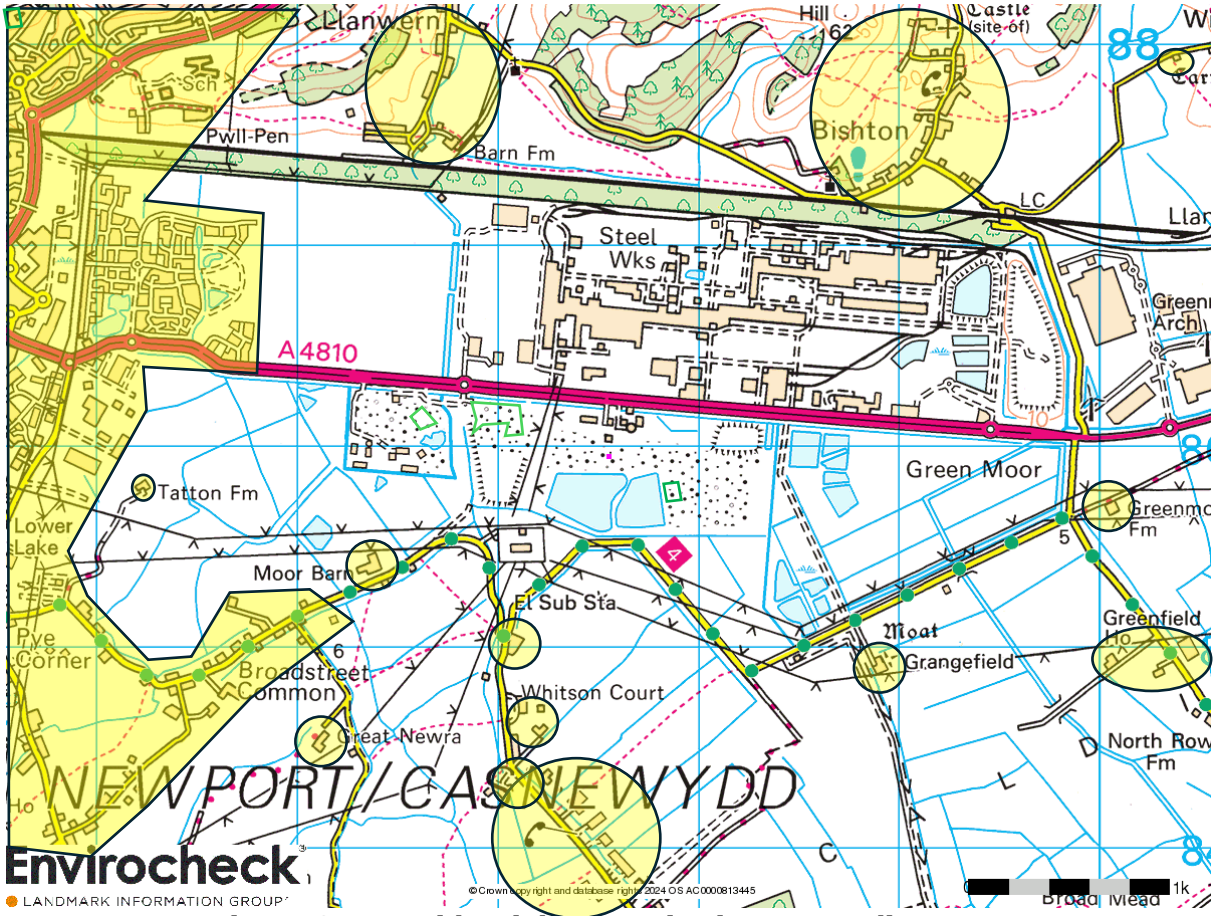


Figure 3-4 Residential properties in surrounding area

3.13 Waste Management

In the 1970's, Newport Borough Council issued a COPA licence for the disposal of waste materials from the steelworks within SSQ. The licence was never surrendered or rescinded and the licence transferred into the Waste Management regime (Licence 024/97). Various parts of the SSQ Waste Management site were subsequently taken into the IPPC permit for the steelworks, but this permit ceased with the cessation of steelmaking in 2002.

Subsequently, Lagoon 27 was taken into the steelworks PPC Permit at the time (Permit BS3905). A Non-Hazardous landfill has also been permitted under the PPC regime within SSQ (PPC Permit GP 3331SV). This PPC landfill is referred to as South Side Queensway Non-Hazardous Landfill (SSQNHL). This landfill has never entered its pre-operational phase.

Natural Resources Wales issued a Closure Notice (No. GR/EM4/01) for Llanwern Landfill, South Side Queensway (SSQ) which specified that the landfill must cease accepting waste for disposal as of 25 February 2008 and that it must be maintained, monitored and controlled as required by the conditions of the authorisation numbered 024/79. In response, Tata prepared a Closure Report and Aftercare Monitoring Plan that was accepted by NRW.

This means that none of the proposed treatment areas are covered by an operational Permit.

3.14 Other Regulated Activities

Alongside the regulation and permitting of landfills, there are many industrial activities in the area. These are related to the immediate activities to the north of SSQ and in the main steelworks. This includes the COMAH facilities at Air Products on the northern boundary of SSQ.

3.15 Potential off-site Contaminative Sources

To the immediate north of the site are several commercial and industrial operations. Beyond the A4810 are the remains of Llanwern steelworks that started operating in the 1960's. With the demise of the 'heavy end' in 2001, the site currently includes mills that roll, pickle and galvanise steel coil for a range of engineering applications. This operation is undertaken under a Permit regulated by Natural Resources Wales.

4 ASSESSMENT METHODOLOGY

In the following chapters the influence the proposed activities could have on the environment is evaluated.

4.1 Approach

In this assessment, plausible exposure pathways are identified in a conceptual site model and evaluated as part of a risk assessment. The evaluation is semi-quantitative and based on the approach adopted by NRW in generic risk assessments that accompany Standard Permit applications. The conceptual site model identifies plausible pollution linkages (source-pathway-receptor relationships) and potential impacts to the local environment which could arise as a result of the proposed activities. This approach enables:

- screening out of those linkages that are insignificant and don't need detailed assessment
- identification of potentially significant risks requiring further assessment

The approach has three stages:

- identify risks from the proposed activities
- assess the risks and check that they are acceptable
- justify appropriate measures to control identified risks, if necessary

In the assessment the following aspects have been considered:

- Odour
- Noise and vibration
- Fugitive emissions to air and water – uncontrolled releases such as dust, run-off from operational areas, but not controlled releases from point-sources and problems with mud, pests or litter
- Controlled releases to air
- Controlled discharges to surface waters
- Controlled discharges to ground or groundwater
- Ozone and Global warming potential
- Site waste

As each area falls within SSQ and the activities to be undertaken in each area are very similar, the risk assessment evaluates each area together, where relevant.

4.2 Identification and Evaluation of Potential Risks

There are a number of methods and approaches available for assessing the environmental risks potentially posed by a project. To provide a structured framework for assessment across several topic areas, generic assessment criteria have been clearly defined. The assessment of potential impacts has been based on a tabulated conceptual model based upon the standard source (hazard)–pathway–receptor model. The approach enables hazards and receptors to be readily identified and evaluates the pathway via which the human and environmental receptors may be impacted. If a pathway exists that potentially connects the hazard to the receptor, then there is a risk that requires evaluation, management and potentially mitigation. If a pathway does not exist there is no risk of impact. This approach has been adopted as it

should be acceptable to all stakeholders with the methodology and findings transparent, defensible and repeatable.

For each plausible impact identified, the potential impacts have been classified as positive or negative and the probability and consequence of the event occurring has been evaluated.

In accordance with the concept of risk assessment, each impact has been characterised in terms of the possible consequence and likelihood. These two terms are functions of five sets of criteria which are defined below:

4.2.1 Consequence of Impact

The consequences of a hazard being realised may be actual or potential harm and is a measure that combines the assessment of:

- Magnitude – the severity of the impact.
- Scale – the geographical extent of influence of the impact.
- Duration – the time period over which the impact will continue to be experienced.

In this assessment the overall consequence of an impact will be rated as very high, high, moderate, low or very low.

4.2.2 Probability of Impact

Probability of exposure is the likelihood of the receptors being exposed to the hazard. Example definitions:

- Very high – exposure is inevitable with no control measures between source and receptor
- High – exposure is probable: direct exposure likely with no/few barriers between hazard source and receptor;
- Moderate – exposure is fairly probable: feasible exposure possible - barriers to exposure less controllable;
- Low – exposure is unlikely: several barriers exist between hazards source and receptors to mitigate against exposure:
- Very Low – exposure is very unlikely: effective, multiple barriers in place to mitigate against exposure.

For each of these criteria, a rating system has been developed. An explanation of the ratings associated with each of the above criteria are provided in Table 4-1 and Table 4-2. To facilitate a semi-quantitative evaluation of the potential impacts, each criteria has been given a numerical score between 1 and 5. Where there is insufficient data to categorise an impact against the criteria, the impact is assigned an appropriate default value and labelled 'unknown'. In these instances, a conservative approach is adopted and negative impacts are assigned a value of 5, reflecting the theoretical worst case scenario. Positive impacts that cannot be confidently rated against the criteria are assigned a value of 3, reflecting a theoretical mid case.

To obtain the overall **consequence** rating of the potential impact, the numerical values for each criteria (magnitude, scale and duration) are added together. Similarly, to obtain the overall **likelihood** of an impact, the exposure and probability scores are added together. The range of possible values for consequence is therefore 3-15, and the range for likelihood is 2-10.

Table 4-1 Criteria for evaluation of the consequence of possible impacts

Criteria	Description	Possible Results		
		Term	Description	Score
Magnitude of Impact	An indication of the severity of the impact, either positive or negative	Very High	Extreme negative effect – Where environmental functions or processes permanently cease Extreme positive effect – Permanently off-sets consumption of natural resources	5
		High	Severe negative effect – Where environmental functions or processes are altered to the extent that they temporarily cease Severe positive effect - Temporarily off-sets consumption of natural resources	4
		Moderate	Moderate negative effect - the affected environment is altered, but functions continue, albeit in a modified way Moderate positive effect – Consumption of natural resources continues, but a significantly lower quantity is required	3
		Low	Minimal negative effect - affects the environment in such a way that functions and processes are not affected Minimal positive effect - Consumption of natural resources continues, but a large amount is still required	2
		Very low	Minimal or negligible effect	1
		Unknown	Magnitude of impact unknown	5*
Scale of Impact	An indication of the geographical extent of the impact, either negative or positive	National	Affects international resources	5
		Regional	Affects the resources of Wales and the UK	4
		District	Affects off-site resources within adjacent County Boroughs	3
		Local	Affects the project area e.g. local residential and industrial areas	2
		Site-specific	Localised, confined to SSQ	1
		Unknown	Extent of impact unknown	5*
Duration of Impact	An indication of the duration or time over which the impact will be experienced, either negative or positive	Permanent	Will remain permanently	5
		Long Term	Extends beyond the recovery operations but not permanent	4
		Medium Term	Throughout the recovery operations	3
		Short Term	Shorter than the recovery operations	2
		Transient	Very short duration	1
		Unknown	Duration of impact unknown	5*

** Score of 3 assigned for positive impacts*

Table 4-2 Criteria for evaluation of the likelihood of possible impacts

Exposure to Impact	An indication of the frequency of the activity that may cause the impact, or the continuity of the exposure, either negative or positive		*Discrete Event*	*Prolonged Exposure from a Single Activity or Event*	
		Very high	Daily or continuous	Exposure in perpetuity	5
		High	Weekly/once per week	Continuous exposure beyond the materials recovery operations, but not permanent	4
		Moderate	Monthly/once per month	Continuous exposure during recovery operation	3
		Low	Bi-annually	Continuous exposure shorter than the recovery operation	2
		Very low	Annually or less frequently	Prolonged exposure but for a very short duration	1
		Unknown	Frequency of activity unknown	Continuity of exposure unknown	5*
Probability of Occurrence	An assessment of the degree of certainty associated with a potential impact, either negative or positive	Highly Likely	Very likely or certain to occur		5
		Likely	Likely to occur		4
		Possible	May possibly occur		3
		Unlikely	Unlikely to occur		2
		Highly Unlikely	Very unlikely to occur, or almost impossible		1
		Unknown	Probability of occurrence unknown		5*

** Score of 3 assigned for positive impacts*

Based upon the overall aggregate scores for consequence and likelihood, each impact is assigned a qualitative term, ranging from 'very low' to 'very high'. The range of values equating to 'very low' and 'very high' have been chosen to approximate the 10th percentile and 90th percentile values of the overall ranges, for both consequence and likelihood. This system is summarised in Table 4-3.

Table 4-3 Overall consequence and likelihood ratings

Overall Consequence	**Sum of Magnitude + Scale + Duration**	**3-4**	**5-7**	**8-11**	**12-14**	**15**
		Very Low	Low	Moderate	High	Very High
Overall Likelihood	**Sum of Exposure + Probability**	**2-3**	**4-5**	**6-7**	**8-9**	**10**
		Very Low	Low	Moderate	High	Very High

Finally, the overall risk is determined by cross-referencing the overall consequence and likelihood ratings, as shown in Table 4-4. This determines the overall risk of the impact, which is assigned one of five qualitative terms, ranging from 'very low significance' to 'very high significance'. Each of the qualitative terms and implication of these levels of significance for the proposed screening and recovery activities are provided in Table 4-5.

Table 4-4 Matrix used to determine overall significance of potential impact

		OVERALL CONSEQUENCE OF IMPACT (Sum of Magnitude + Duration + Scale)				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
OVERALL LIKELIHOOD OF IMPACT (Sum of Exposure and Probability)	**Very Low**	Very Low	Very Low	Low	Low	Moderate
	Low	Very Low	Low	Low	Moderate	High
	Moderate	Low	Low	Moderate	High	High
	High	Low	Moderate	High	High	Very High
	Very High	Moderate	High	High	Very High	Very High

Table 4-5 Explanation and interpretation of significance ratings for impacts remaining after mitigation

Significance of Impact After Mitigation	**Implications for Project**	
Very high	Extremely beneficial and enduring effect	An automatic fatal flaw. The recovery scheme should not proceed unless the design is changed so that this impact is eliminated or its significance is reduced to acceptable levels. There is a high probability that severe harm could arise to a designated receptor from an identified hazard.
High	Very substantial improvement to existing resources	Unacceptable effect. The recovery scheme should not proceed unless the design is changed so that the significance of this impact is reduced to acceptable levels. Harm is likely to arise to a designated receptor from an identified hazard without intervention.
Moderate	Appreciable improvement to, or will sustain, existing resources	Effect is serious enough to cause concern. Changes to recovery scheme should be considered. It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild.
Low	Some benefits	Acceptable effect - the possibility of the impact occurring is by no means certain and the consequence of exposure is such that there would be no measurable harm.
Very low	Negligible effect - probable that impact could occur but the impact would not be measurable	Negligible effect - probable that impact could occur but the impact would not be measurable.

4.2.3 Presentation of Plausible Risks

In view of the large amount of data to be handled, matrices are used to present the potential risk ratings associated with the proposed activities in a clear, transparent and consistent manner.

Individual tables corresponding to each aspect (such as air quality, surface water) are used to assess the risks associated with the potential impacts.

5 FOCUSSING THE ASSESSMENT

5.1 Site Context

The scope of the Permit variation sought, the location of the activities proposed and the control measures that will be implemented will limit the potential risks posed to the environment.

The key aspects related to each area are listed below:

- Recovery operations are temporary, will enable recovery of waste and enable brownfield land to be brought into use.
- All processing will occur in areas that have been used for industrial activities previously.
- Whole SSQ is served by a drainage system that protects wider environment.
- Much of the material to be processed is already in place at SSQ – the processing activities will 'go to the waste' rather than hauling large waste volumes long distances for processing either on and off-site.
- No area is easily visible by any members of the public.
- All areas are located within the land ownership of the steel works and will benefit from a high level of security.
- No area is within 500m of residential properties.
- No area is above a groundwater Source Protection Zone.
- No area is within an Air Quality Management Area (AQMA).
- No area is within 50 metres of any spring or well, or of any borehole used to supply water for domestic or food production purposes.
- No area is within 50 meters of a site that has relevant species of habitats protected under the Biodiversity Action Plan.
- No area is within 50 metres of a National Nature Reserve (NNR), Local Nature Reserve (LNR), Local Wildlife Site (LWS), Ancient woodland or Scheduled Ancient Monument.
- No area is within 250 metres of any borehole used to supply water for domestic or food production.
- No area is within 250 metres of the presence of Great Crested Newts where it is linked to breeding ponds of the newts by good habitat.
- No area is within 200 metres of a European Site, Ramsar site or a Site of Special Scientific Interest (SSSI) designated for flora and fauna.
- Processing will use conventional mobile plant in each area, supervised by a TCM and in accordance with Permit and documented management system.

The principle activities that would be covered by the Permit, and which could impact the environment are haulage, stockpiling and storage and processing for recovery. The impact assessment solely assesses the potential specific impacts associated with these activities. Therefore, prior to undertaking the impact evaluation, a screening of the potential hazards and receptors has been made to ensure that the impact assessment is focussed.

5.2 Evaluation of Hazards

The hazards associated with the proposed recovery operations have been identified through a screening exercise. The identified hazards are listed in Tables 5-1.

Table 5-1 Key Hazards Screening Matrix

Aspect	Potential Hazard	Hazard taken forward for impact assessment	Comment/Justification
Noise and Vibration	Vehicle movements leading to increase in noise and vibration	✓	All on-site materials will be handled by plant subject to proactive preventative maintenance programmes.
	Waste Deposition	No	No waste will be permanently deposited at SSQ. Any waste generated will be taken off-site under appropriate Duty of Care.
	Materials handling and processing of waste	✓	Recovery operations will require unloading, loading and materials handling.
Odour	Malodorous gas/ vapour	No	Biodegradable/putrescible waste will not be accepted at SSQ. Recovery operations will not expose biodegradable/ putrescible wastes that would lead to generation of malodorous gas and leachate encourage scavenging. Quarantine area with sealed skip will be available at all times in case of abnormal incident. Site operated in accordance with Permit conditions
	Smoke from waste fire	No	Strict waste acceptance procedures will be implemented. Materials to be processed are non-combustible. Fire related to plant would be self-contained and not capable of spreading to non-combustible waste Recovery operations will not expose wastes that are flammable.
Airborne Particulate Matter	Materials handling and processing	✓	Materials handling outdoors will be required.
	Dispersion of dust and particulates from stockpiles	✓	Stockpiles of waste and aggregates may be susceptible to dispersion during suitable climatic conditions.
	Fire in site offices / plant	No	Documented management systems are already in place to prevent and manage potential fires. All plant and vehicles will be locked down and secured at the end of each day with 6m gap between plant.
	Vehicle Trafficking	✓	All on-site materials will be handled by conventional plant subject to proactive preventative maintenance programmes. Management systems in place to prevent and manage dust occurrence.
Polluting Fluids	Suspended solids in surface run-off	✓	Each area is within the SSQ area that is served by ditches that drain to Tata Effluent Treatment Plant. Bulk of materials to be processed already present at SSQ.
	Contaminants entrained in groundwater following infiltration through hardstanding	✓	Recovery operations will be undertaken on hardstanding platform. Any infiltration passes to drainage system that directs run-off to Tata Effluent Treatment Plant. Bulk of materials to be processed already present at SSQ.
	Use of wash water in Area 2	✓	
	Spillage/ leakage of fuel oils	No	Documented management systems to be place regarding storage of polluting substances and management of spills and leaks. Secondary containment in accordance with current Pollution Prevention Guidance.

Aspect	Potential Hazard	Hazard taken forward for impact assessment	Comment/Justification
Flooding	Inundation and mobilisation of waste	No	Site is in an area at risk of flooding. As only non-hazardous waste to be processed any waste washed off site will add to the volume of the local post-flood clean-up workload, rather than the hazard. Much of the material already present at SSQ. No significant change to risk profile.
Scavengers (birds, vermin, insects)	Faecal Droppings	No	Strict waste acceptance procedures will be implemented. Recovery operations will not expose biodegradable/putrescible wastes that would encourage pests. Documented management systems are already in place to deal with vermin. Site operated in accordance with Permit conditions.
	Infestation	No	
Litter	Light Fraction Delivery Waste	No	Strict waste acceptance procedures will be implemented. Recovery operations will only process suitable aggregate materials. No light fraction waste to be processed. Documented management systems are already in place to deal with litter. SSQ is fenced from public.
	Light Fraction Deposited Waste	No	
Mud on Road	Vehicle Movements	✓	Each area to be provided with wheel wash and weighbridge. Documented management systems in place to prevent and manage mud on road. Site operated in accordance with Permit conditions.
Plant Movement	Collision with other plant and site staff/visitors	No	Documented management systems are already in place to manage site vehicle movements. New drivers will be required to be inducted to site rules.
Visual Resources and Landscape	Change to current landscape	No	Recovery operations will require creation of temporary stockpiles and use of mobile plant but activities are temporary and site remote and not readily visible.
Primary Resources	Reduced consumption of primary resources e.g. quarried stone	✓	Positive Impact. Recovery operations will potentially offer the opportunity to reduce consumption of primary resources through supply of secondary aggregates.
	Redevelopment of brownfield land	✓	Recovery operations will enable brownfield land to be redeveloped avoiding use of greenfield land.
Waste	Generation of waste	No	Aim is for zero waste disposal.

The hazards potentially associated with the screening and materials recovery operations that have been taken forward for impact assessment are:

- Vehicle movements generating noise and vibration
- Unloading and processing of waste for recovery
- Operation of recovery operation generating noise and vibration
- Dispersion of particulates during materials handling
- Dispersion of particulates from stockpiles
- Vehicle movements generating dust
- Suspended solids
- Contaminants entrained in groundwater following infiltration through hardstanding
- Use of wash water in Area 2_10

- Spillage/leakage of fuel oils
- Vehicles movements generating mud on roads

Such hazards are not new to DLS as DLS operates a materials recycling facility at Port Talbot Steelworks for Tata where the same waste is processed. As a consequence, proven documented management systems and effective controls are known and integrated to the works. Further, the wider SSQ area has been used for such activities previously for many years but this Permit will allow for closer oversight and scrutiny.

In addition, the proposed recovery operations will ultimately provide secondary aggregate for use and allow brownfield land to be brought into use.

5.3 Evaluation of Receptors

Receptor screening has examined the presence of environmental, human and natural resource receptors. The evaluation has essentially been limited to a radial zone centred on the facility with a diameter of some 2000m. This does not preclude receptors existing beyond this distance, but due to the nature of the hazards if the risks are shown to be acceptable to the receptors within this zone, then the risks posed to receptors outside this zone should also be acceptable.

The screening matrix presented in Table 5-2 summarises the identified receptors. A brief comment on their status and justification as to their inclusion is also provided.

All of the identified receptors have been taken forward as part of the impact assessment.

Table 5-2 Receptor Screening Matrix

Main Receptor Category	Receptor/ Benefactor Type	Receptor/Benefactor Detail	Comment/Justification
Human	On-site DLS/ sub-contractor staff	Site operatives	A small number of staff would be involved with all aspects of the recovery operations.
	Delivery Personnel	Delivery Driver and Crew	Some waste will be delivered for processing and some products will be removed off site
	Emergency Services Staff	Emergency Services Staff	Emergency personnel may be required at any part of the site.
	Other Working Personnel	Other companies staff working at SSQ	Site is surrounded by land owned by Tata
	General Public	Footpath Walkers	No authorised access to SSQ
	Regulatory Staff	NRW Staff	Access all areas on an intermittent basis
Groundwater	Perched groundwater at base of slag	Groundwater perched on impermeable clay	Groundwater not considered plausible receptor given presence of natural geological barrier and lack of aquifers
Surface Water	Drainage Ditches	Drainage ditches surround SSQ and drain to Water Treatment Plant	Cut-off ditches proven to be protective of wider environment
Primary Resources	Aggregate users	Construction activities benefit from use of recycled aggregate	On-site and off-site users of aggregate
Flora/Fauna	Gwent Levels SSSI	Surface water ditches located to south of proposed activities. Ditches are set upon the impermeable clay	Nationally important habitats and species.

5.4 Evaluation of Pathways

Fundamental to the source-pathway-receptor model is the presence of a linkage in the form of a pathway or mechanism that allows the receptor to be impacted by the hazard. If the pathway is not present, then there is no risk of impact as the hazard cannot affect the receptor. Conversely, if the pathway can be cut there is no way in which the receptor may be impacted by the hazard and there is no risk of impact.

To ensure that the impact assessment only focuses on plausible impact pathways a matrix comparing all identified hazards with all identified receptors has been made in Table 5-3. A diagrammatic conceptual site model has been developed and is summarised in Figure 5-1. Where a plausible pathway exists this is identified in the matrix with a number which links to a specific pathway identified as a footnote in the table. Plausible pathways connecting a receptor with an identified hazard are also highlighted grey. All plausible impact pathways are therefore forward for the impact assessments in the following sections.

Figure 5-1 Conceptual Site Model

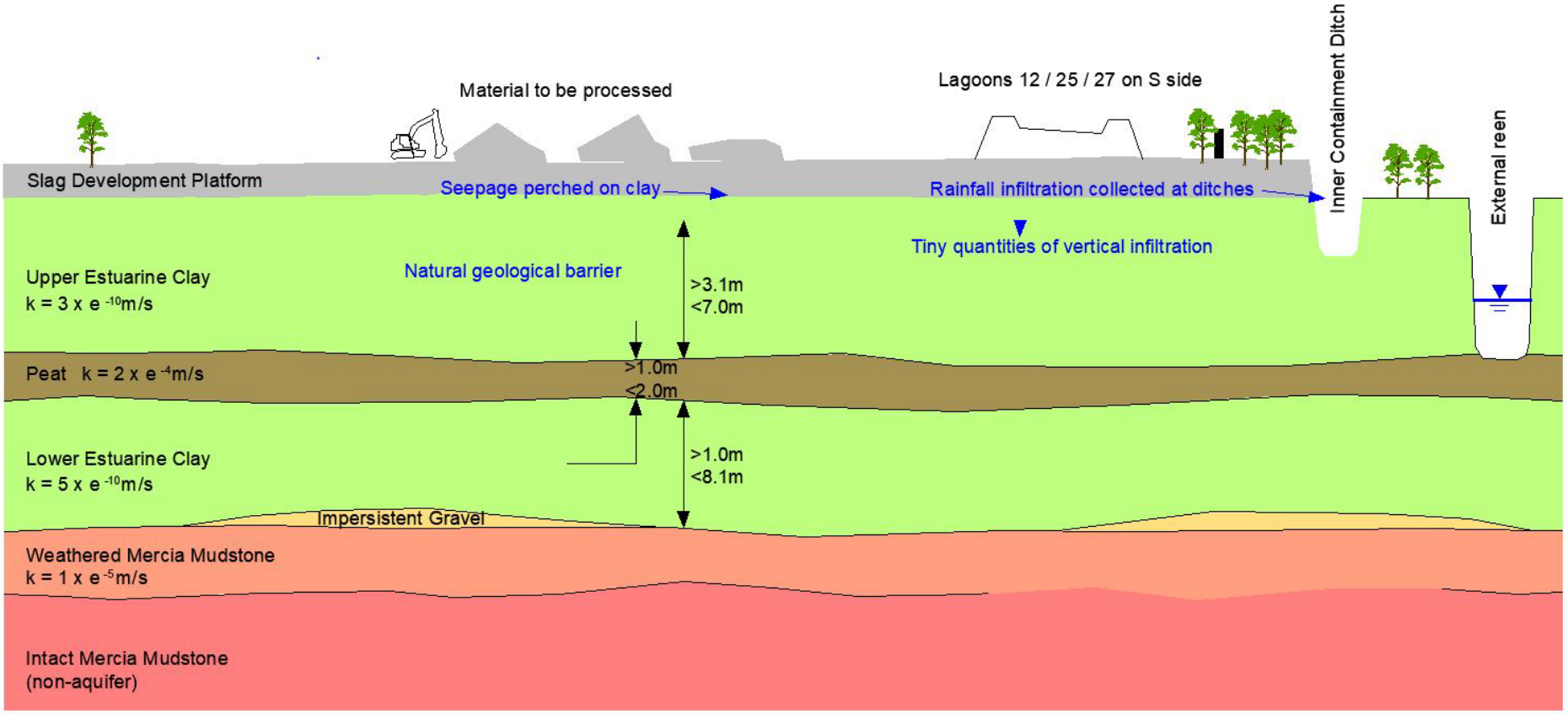


Table 5-3 Plausible Exposure Pathway Screening

			RELEASE OF AIRBORNE PARTICULATES			RELEASE OF POLLUTING FLUIDS				NOISE AND VIBRATION		MUD ON ROAD	PRIMARY RESOURCES
			Vehicle movements leading to dust generation	Materials handling and processing of waste for recovery	Dispersion of dust from temporary stockpiles	Contaminants entrained in groundwater following infiltration through areas hardstanding	Suspended solids in surface run-off	Area 2 wash water	Spillage/ leakage of fuel oils	Vehicle movements leading to increase noise and vibration	Materials handling and processing for recovery	Trafficking of mud onto public road	Primary resources
HUMAN	On-site DLS/ sub-contractor staff		1	1	1	N	N	N	N	6	6	7	N
	Delivery Personnel		1	1	1	N	N	N	N	6	6	7	N
	Emergency Services Staff		1	1	1	N	N	N	N	6	6	7	N
	Other Working Personnel		1	1	1	N	N	N	N	6	6	7	N
	General Public		1	1	1	N	N	N	N	6	6	7	N
	Regulatory Staff		1	1	1	N	N	N	N	6	6	7	N
SURFACE WATER	Drainage Ditches		N	N	N	4, 5	4, 5	4, 5	4, 5	N	N	5	N
PRIMARY RESOURCES	Materials used in steel making		N	N	N	N	N	N	N	N	N	N	8
	Aggregates users		N	N	N	N	N	N	N	N	N	N	8
FLORA / FAUNA	Ditches in Gwent Levels SSSI		2	2	2	N	N	N	N	6	6	5	N

NOTES TO TABLE

N No plausible pathway is considered to exist between identified receptor and hazards.

1. Receptor may be impacted by direct inhalation or ingestion of particulates.
2. Receptor may be impacted by fall out of airborne particulates causing smothering.
3. Receptor may be impacted by direct inhalation or ingestion of particulates or indirect ingestion of particulates attached to vegetation
4. Receptor may be impacted by infiltration through unsaturated zone
5. Receptor may be impacted by run-off quality
6. Receptor may be impacted by nuisance associated with noise and vibration
7. Receptor may be impacted by nuisance and dangerous road conditions
8. Benefactor may benefit from reduction in consumption of primary resources

6 EVALUATION OF RISKS

The output from the assessment is presented as a series of risk assessment matrices in Tables 6-1 to 6-3. These are also discussed in the following sections.

6.1 Release of Airborne Particulates

The external storage and processing of waste related to the production of aggregates clearly has the potential to release particulates under certain conditions.

The facility will therefore be subject to routine scrutiny and controls to ensure airborne impacts are prevented, identified, managed and reduced to acceptable levels. Each item of plant will be fitted with dust suppression and additional misters and bowsers will be deployed as required to any part of the operation, including transport routes. These controls will not only be used when wind speeds are high but also when there is a possibility of thermal ground disturbance encouraging particle lift off during the summer months. Further, as much of the dust arises from the way in which materials are handled and the size of stockpiles, care will be taken to ensure the site is efficiently organised to minimise vehicle movements and particulate release during loading and unloading vehicles. To ensure the activities are not impacting off-site receptors and the human health of site operatives is protected, daily site inspections will identify any additional measures required.

Should complaints be received, these will be managed through the procedures documented in the Environmental Management System. Following receipt of a complaint investigations aimed at identifying the root-cause will be undertaken. Provided these measures are implemented the risk of airborne particulates to the identified receptors is considered to be low, as summarised in Tables 6-1 to 6-3.

The plant used to process the wastes will typically be powered by diesel motors and will only be operational on an as required basis. Each item of plant will be subject to a preventative maintenance programme. All vehicles delivering waste and transporting products off-site will also be diesel powered. Wherever possible, DLS will optimise vehicle movements by linking the delivery of waste to the site with the delivery of aggregates and recovered materials.

In addition to carbon dioxide, the diesel engines will also release NO_x, hydrocarbons, carbon monoxide and PM_{10} particulates. Ozone could potentially be produced at low level by photochemical reactions with these substances. The emissions of these substances, will however, be effectively controlled at the lowest level reasonably possible, by ensuring that the plant and vehicles are subject to a preventative maintenance programme.

Table 6-1 Assessment of potential impact of airborne particulates on identified human receptors

Hazard	Pathway	Magnitude	Scale	Duration	Overall Consequence of Impact	Exposure Frequency	Probability of Occurrence	Overall Likelihood	Mitigation Measures	Residual Risk under Normal Conditions
Vehicle movements leading to dust dispersion	1) Direct inhalation or ingestion of particulates	3	2	3	8 (Moderate)	3	2	5 (Low)	Ensure dust suppression equipment (water bowser) is readily available during dry weather and warm weather periods. Regularly dampen site roads as required Provide correct RPE to site staff. Regularly maintain vehicles.	Low
Materials handling and recovery operations		3	2	3	8 (Moderate)	3	2	5 (Low)	Screens fitted with dust suppression units Cessation of operations until dust can be controlled or climatic conditions are more favourable. Implement Local AQMP.	Low
Dispersion of dust from temporary stockpiles		3	2	3	8 (Moderate)	3	2	5 (Low)	Ensure dust suppression equipment is readily available during weather periods when particulate uplift is likely. Cover fine grained stockpiles if necessary Ensure stockpiles of material are regularly utilised. Ensure stockpiles are not disturbed unnecessarily.	Low

Table 6-2 Assessment of potential impact of airborne particulates on flora and fauna at SSSI

Hazard	Pathway	Mitigation Measures	Magnitude	Scale	Duration	Overall Consequence of Impact	Exposure Frequency	Probability of Occurrence	Overall Likelihood	Overall Significance of Impact
Vehicle movements leading to dust dispersion	2) Receptor may be impacted by fall out of airborne particulates causing smothering	Ensure dust suppression equipment (water bowser) is readily available during dry weather periods. Regularly clean site roads. Make available dust masks to site staff. Regularly maintain vehicles.	3	3	3	9 (Moderate)	3	1	4 (Low)	Low
Operation of screens leading to dust dispersion		Screens fitted with dust suppression units. Cessation of operations until dust can be controlled or climatic conditions are more favourable.	3	3	3	9 (Moderate)	3	1	4 (Low)	Low
Dispersion of dust from temporary stockpiles		Ensure dust suppression equipment (water bowser) is readily available during dry weather periods. Cover fine grained stockpiles if necessary. Ensure stockpiles of material are regularly utilised.	3	3	3	9 (Moderate)	3	1	4 (Low)	Low

6.2 Release of Polluting Fluids

All wastes to be accepted at the site will be subject to stringent waste acceptance controls. None of the wastes will be liquid and many will be either listed inert or non-hazardous.

As most of the wastes for aggregate production are considered non-hazardous or inert, their storage and weathering outdoors will not pose a significant risk to the environment but the control of suspended solids will be important. This is similar to the generic risk assessment underpinning many Standard Rules Permits. As the site benefits from a granular weathered development platform this will act as a trap potentially retarding the movement of suspended solids. Additionally, as Tata control all of the surface water ditches in the immediate area and their ultimate point of discharge, there is no pathway for suspended solids to escape to the wider environment. In this context, the risk to surface water is considered low, as summarised in Table 6-3.

The hardstanding platform also provides additional unsaturated zone through which infiltration would need to pass before entering shallow groundwater, perched above the clay layer. Monitoring of the shallow groundwater has previously found the groundwater to be impacted by elevated pH and a range of contaminants at low levels and that it may be in hydraulic continuity with parts of the surface water ditches. As the wastes proposed to be accepted and temporarily stored and exposed to weathering are similar to the materials used to construct the hardstanding platform, the impact on shallow groundwater is considered to be low, as summarised in Table 6-3.

Table 6-3 Assessment of potential risks to surface water

Hazard	Pathway	Mitigation Measures	Magnitude	Scale	Duration	Overall Consequence of Impact	Exposure Frequency	Probability of Occurrence	Overall Likelihood	Overall Significance of Impact
Contaminants entrained in infiltration migrating to groundwater	4. Infiltration through hardstanding platform 5. Direct run-off to adjacent surface water ditches	Ensure strict waste acceptance controls are implemented. Ensure sealed skips are available for quarantine. Provide all liquids with bunded storage. Provide spill kits on site to deal with minor spills. Ensure DLS Emergency Response Plan for Spillages is implemented.	2	1	3	6 (Low)	3	3	6 (Moderate)	Low
Suspended solids in surface run-off		Ensure strict waste acceptance controls are implemented. Ensure sealed skips are available for quarantine. Routinely inspect surface water ditches.	2	1	3	6 (Low)	2	4	4 (Moderate)	Low
Area 2_10 wash water		Only small quantity of water to be present in closed loop wash plant. Water to be tankered off-site once no longer required.	1	1	1	3 (Very Low)	2	1	3 (Very Low)	Very Low
Spillage/ leakage of fuel oils		No fuel to be stored at site.	2	1	2	5 (Low)	2	1	3 (Very Low)	Very Low

6.3 Noise and Vibration

All of the vehicles and plant handling materials will comprise modern plant designed to meet current legislative controls relating to noise and vibration emissions. All plant and vehicles will also be subject to a preventative maintenance programme and the requirements of the steel works noise management plan. To ensure that noise and vibration emissions from the on-site activities are not likely to cause off-site pollution DLS will prevent, or where that is not practicable minimise, off-site noise migration. Measures that will be adopted will include the use of modern modular plant fitted with appropriate silencers, implementation of preventative maintenance programme, orientating site activities to minimise noise from reversing warning devices and use of broadband directional alarm to vehicles, where feasible. As there are few sensitive receptors within 500m of the site, the risks are considered to be low and acceptable provided the control measures are implemented.

Table 6-4 Assessment of potential impact of noise and vibration on identified human receptors

Hazard	Pathway	Mitigation Measures	Magnitude	Scale	Duration	Overall Consequence of Impact	Exposure Frequency	Probability of Occurrence	Overall Likelihood	Residual Risk under Normal Conditions
Vehicle movements leading to dust dispersion	6) Nuisance associated with elevated noise levels	Vehicles will be routinely maintained as part of proactive preventative maintenance programme. Vehicles used will be the same as those currently used as part of steel making operations.	3	2	3	8 (Moderate)	3	2	5 (Low)	Low
Materials handling and recovery operations		Recovery plant is modern and well maintained and designed to minimise sound output. Plan will be fitted with noise reducers and operated behind stockpiles where possible.	3	2	3	8 (Moderate)	3	2	5 (Low)	Low

Table 6-5 Assessment of potential impact of noise and vibration on Flora and Fauna at SSSI

Hazard	Pathway	Mitigation Measures	Magnitude	Scale	Duration	Overall Consequence of Impact	Exposure Frequency	Probability of Occurrence	Overall Likelihood	Overall Significance of Impact
Vehicle movements leading to increase noise and vibration	6) Disturbance associated with elevated noise levels	Vehicles will be routinely maintained as part of proactive preventative maintenance programme. Vehicles used will be the same as those currently used as part of steel making operations.	1	3	3	7 (Low)	3	1	4 (Low)	Low
Materials handling and processing for recovery		Recovery plant is modern and well maintained and designed to minimise sound output. Plan will be fitted with noise reducers and operated behind stockpiles where possible.	1	3	3	7 (Low)	3	1	4 (Low)	Low

6.4 Mud on Road

All vehicles entering and leaving the sites will be able to clean wheels before returning to public highways using on-site wheel wash. All vehicles will be informed to sheet all materials during transport.

To ensure that there is no build of particulates on the immediate A4810, the road will be inspected and photographed weekly and a road sweeper used to clear the road if debris can be seen to be accumulating. As all run-off from the adjacent road enters the cut-off ditch that feeds into the Surface Water Treatment System there is little opportunity for impact further downstream.

Taking into account these control measures the overall risk of mud on road is low, as indicated in Table 7-6.

Table 6-6 Assessment of mud on road from recovery activity

Hazard	Pathway	Mitigation Measures	Magnitude	Scale	Duration	Overall Consequence of Impact	Exposure Frequency	Probability of Occurrence	Overall Likelihood	Overall Significance of Impact
Vehicle movements leading to mud on road	6 Nuisance and 7. Dangerous roads	Vehicles will be routinely maintained as part of proactive preventative maintenance programme. All vehicles to use wheel wash. Road sweeping to be undertaken if necessary.	1	2	3	6 (Low)	2	2	4 (Low)	Low

6.5 Raw Materials Usage

The plant is to receive wastes that require no external raw materials for their recovery apart from water used to wash selected waste streams. Surface water in the adjacent ditch, controlled by Tata, will be used for topping up the closed loop system. The only use of potable water will be the small amount consumed by the personnel in the portacabin offices.

6.6 Production of Waste

DLS is aiming for zero waste production at the site. This will be achieved by separating for off-site recovery any contraries (e.g. wood, metal and plastic) entrained in the main waste streams.

The satisfactory production of products (aggregates) and recovered materials will require rigorous testing programmes to be implemented as part of Factory Production Control. Should this identify any material that does not meet the requirements, then the material will be re-processed.

Should disposal ever be required, DLS will ensure that all aspects of Duty of Care are satisfied.

6.7 Summary

The assessments demonstrate that the proposed activities will not result in significant unacceptable environmental impacts provided the control measures identified are fully adopted. To minimise the opportunity of these measures not being fully implemented, the operation of the facility will be in accordance with a documented management system which will specifically include measures aimed at protecting the environment. These will include:

- processing of waste will be undertaken in accordance with the Permit and a documented management system.
- DLS hold ISO9001 and ISO14001 certification and the principles underlying these standards will be applied to the operation of the site.
- site will be managed by personnel with relevant and current WAMITAB certification and waste management experience.
- areas used to store and process wastes will be on hardstanding capable of supporting the operations.
- little potentially combustible waste wood will be temporarily stored.
- waste will not be burned, either in the open, inside buildings or in any form of incinerator.
- wastes will only be treated using processes identified in the Permit.
- where waste disposal is necessary, this will be undertaken in a manner which minimises its impact on the environment.
- the activities shall not extend beyond the Permit boundary.
- all liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container shall be used.
- preventative maintenance programme will be in place for all plant and infrastructure.

7 INTEGRATION TO MANAGEMENT

7.1 Link to Documented Management System

For each of the exposure pathways evaluated in the assessment, DLS will ensure that a fully documented management system is in place by the time the site is operational.

7.2 Monitoring Plan

DLS will also implement a documented monitoring programme to ensure the predictions of the impact assessment are validated. The programme will allow contingency actions to be taken.

8 SUMMARY AND CONCLUSIONS

The assessment demonstrates that the operation of the waste management facilities will not lead to any significant negative impacts to the environment or humans. Fugitive emissions are not likely to cause problems. The scheme does, however, provide many positive impacts.

This risk assessment will need to be updated when necessary and directly linked to the Environmental Management System.

Report 2
Environmental Risk Assessment

SSQ BESPOKE MATERIALS RECYCLING FACILITY, LLANWERN

Appendix 1
Manufacturers Factsheets

Report Number 2473r2v2d1024

McCloskey® INTERNATIONAL

R SERIES SCREENING

The R Series screeners are available in several configurations including Dual Power, and are tough, robust screening tools designed to cope with the heaviest of applications. With the ability to handle some of the worst, untreated construction and demolition waste, R Series screeners can minimize material pre-handling and provide clean end products. With a High Energy Screenbox – the largest in its class – the R Series impress operators across applications like site reclamation, construction and demolition waste, working with difficult materials such as heavy rock, sticky clay and fines, and boulder clay.

The R155 and R230 models are also available with a longer hopper and an extended tail conveyor. This provides maximum load flexibility and is designed for use with larger loaders. The 16ft target is 25% larger, allowing for more material and no spillage, making both models an excellent mobile solution for materials handling operations.

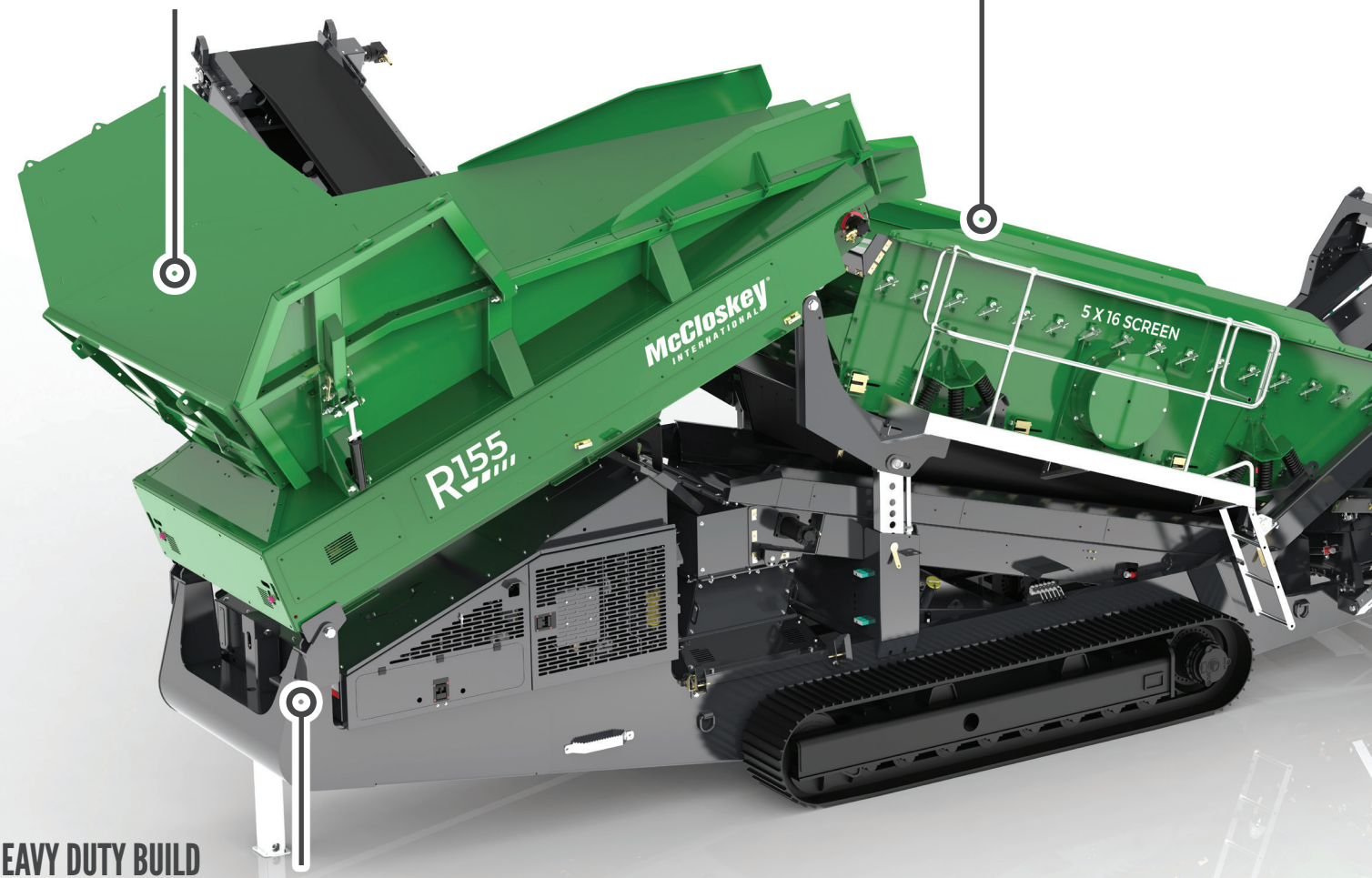
For more information, contact your dealer: mccloskeyinternational.com/dealer-map

LARGE HOPPER

The R-Series hopper is designed to be used with larger loaders, allowing for more material and less spillage. Hopper extensions are available as an option well as a long hopper design for ease of loading and enhanced capacity.

SCREENBOX

The R155's high energy screenbox delivers the highest quality product by maximizing the screening area. Screen raises at lower end for easy bottom deck access.



HEAVY DUTY BUILD

The R-Series screeners are one of the most robust and durable machines on the market, working with some of the most difficult materials on earth.

R SERIES SCREENERS

- Wide hopper designed to be used with larger loaders allows for more material and no spillage
- Among the most robust and durable machines on the market, the R Series is built to excel at the toughest screening jobs
- High Energy screenbox delivers the highest product capacity
- Large open engine bay
- Oversized heavy duty belt as standard
- Direct feed hopper
- Screen raises for easy access to bottom deck
- Track mobile

WIDE CHUTES

Chute design minimizes potential material spillage and blockages.

OPTIONS

Heavy Duty Top Deck Finger Screen.
Bottom deck finger screen.
Top deck punch plate screen.
Bottom deck punch plate
Top deck Bofor screen
Flex-Flow Screen
Radio remote control for tracks.
Plate Apron Feeder instead of Belt Feeder.

MORE POWER OPTIONS

McCloskey screeners are ready to get to work in Dual Power boosting your operational fuel efficiency and reducing costs.

DUAL POWER

McCloskey® INTERNATIONAL

R70 SCREENER

Engine	98kW (130Hp)
Screenbox	
Top Deck	2.80m x 1.22m (9’ x 4’)
Bottom Deck	2.59m x 1.22m (8.5’ x 4’)
Feed Conveyor	
Belt Width	1200mm (48”)
Tail Conveyor	
Stockpile Height	3.38m (11’ – 1”)
Fines Conveyor	
Stockpile Height	3.56m (11’ – 8”)
Mid-size Conveyor	
Stockpile Height	3.56m (11’ – 8”)

R155 SCREENER

Engine	98kW (130Hp)
Screenbox	
Top Deck	4.88m x 1.53m (16’ x 5’)
Bottom Deck	4.58m x 1.53m (15’ x 5’)
Feed Conveyor	1400mm (55”)
Belt Width	
Tail Conveyor	2.77m (9’ – 1”) -
Stockpile Height	3.75m (12’ – 3”)
Fines Conveyor	3.47m (11’ – 5”) -
Stockpile Height	3.96m (13’)
Mid-size Conveyor	2.51m (8’ – 3”) -
Stockpile Height	3.60m (11’ – 10”)

R105 SCREENER

Engine	98kW (130Hp)
Screenbox	
Top Deck	3.66m x 1.37m (12’ x 4.5’)
Bottom Deck	3.46m x 1.37m (11.4’ x 4.5’)
Feed Conveyor	
Belt Width	1200mm (48”)
Tail Conveyor	
Stockpile Height	3.45m (11’ – 4”)
Fines Conveyor	
Stockpile Height	3.63m (11’ – 11”)
Mid-size Conveyor	
Stockpile Height	3.63m (11’ – 11”)

R230 SCREENER

Engine	168kW (225Hp)
Screenbox	
Top Deck	6.10m x 1.83m (20’ x 6’)
Bottom Deck	5.49m x 1.83m (18’ x 6’)
Feed Conveyor	1500mm (60’)
Belt Width	
Tail Conveyor	
Stockpile Height	3.83m (12’ – 6”)
Fines Conveyor	
Stockpile Height	4.10m (13’ – 5.3”)
Mid-size Conveyor	
Stockpile Height	3.66m (12’)





WEIR MINERALS

TRIO

TRIO Modular Plant

High Efficiency Modular Solutions

DIAMOND
diamondequip.com

www.trioproducts.com

At TRIO we strive to provide our customers with the most rugged, robust, and reliable equipment for the most demanding applications in the harshest environments.

We provide customized high value solutions according to our customers' needs, from single machines to stationary or portable plants, including turnkey projects.

Building Solutions Together

TRIO continues to expand as a world class designer & manufacturer of crushers, screens, washing equipment and conveyors for the aggregate, mining, recycling, and industrial minerals industries. The core goal of our company is to pursue product improvement, quality, and provide our customers with the most cost-effective equipment solutions.

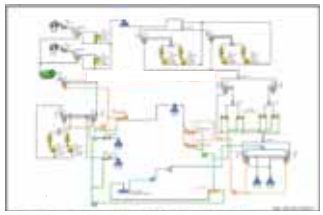
TRIO is one of the market leaders in modular plant designs, offering a larger array of designs to choose from than any other OEM. This results in a rapid development time that is unmatched in the industry, from conception through commissioning.

All of our Modular Structures are pre-assembled prior to shipping. This pre-assembly includes installing the equipment, motors, hoppers and guards on the modularstructure and test running to ensure proper fit and operation. The modular plant is then disassembled and all the parts are clearly marked to ensuresimple and efficient assembly in the field. This pre-assembly practice ensures a well-organized, labor saving installation with the most efficient timeline.

TRIO' s modular plants are built using heavy duty, bolt-together structural steel members. Moderate customization is available to accommodate elevation requirements, tailored access points, maintenance platforms and other customer requested changes. Ourmodular structures are designed to be shipped using standard ocean containers making them very economical to transport to any destination.

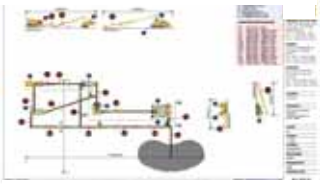
1. Develop process flow

Intensive customer collaboration is a key ingredientwe use to develop an optimized process flow diagram. This is generally done with a mass balance flow program like Agg-Flow.



2. Develop 2D Layout

A 2D Visio plant layout is the next step in the development of a modular plant system. This 2D layoutprovides a clear illustration of the plant configuration and size.



3. Develop 3D Layout

A Sales 3D layout could be the next step to show additional details of a modular plant system.The 3D layoutprovides a closer look at the details in the plant design and helps the customer and TRIO evaluate the proposed plants functionality.

4. Develop Video Walk -through and Review 3D layout

During a 3D review an additional videowalk -through is an option for large complex plant designs.

5. Develop 2D Layout through GoogleEarth

The final 3D option is to place the proposed plant design onthe customers mine site, via Google Earth.

6. Factory Assembly

Every Modular structure is fully assembled and the equipment is run at operational speed to ensure proper fit and function.

7. Designed for Global Transport

Our modular structures are designed to be shipped in standard ocean containers, making them very economical to transport to any global destination.

8 . Field Assembly

The on-site field assembly, of a TRIO Modular Plant is simple and straight forward with the documentation we provide.

Modular Feeding Solutions

TF Feeder Modules

Our TF feeders' incorporate robust steel coil springs and a thick feeder pan, fabricated and stress relieved with honey comb style reinforcement, capable of absorbing tremendous shock loads from loading equipment. The grizzly section removes undersize material and utilizes wear resistant materials with tapered openings in both dimensions preventing clogging and packing.

Grizzly Feeder Station				
Model	Main Equipment Model	Size (MM)	Max Feeding Size (MM)	Capacity (MTPH)
MF4620	TF4620	1,124*6,000	700	370 - 535
MF5220	TF5220	1,300*6,000	800	410 - 615
MF5820	TF5820	1,475*6,000	900	450 - 700
MF7224	TF7224	1,830*7,320	1,300	700-1,235

- Data for marketing purposes subject to change with product upgrades. Please consult TRIO for your customized solutions.

EF Feeder Modules

Vibrating Pan Feeders are ideally suited for installation in surge tunnels and for surge bin applications. These variable speed feeders are designed with AR-lined bed and side plates, welded and stress-relieved steel frame, for continuous duty applications.With easy adjustment of the speed and eccentricity TRIO EF Series feeders can be optimized for material flow control in the most demanding applications.

Pan Feeder Station				
Model	Main Equipment Model	Size (MM)	Max Feeding Size (MM)	Capacity (MTPH)
MEF2404	EF2404	600*1,200	200	110 - 160
MEF3005	EF3005	762*1,524	260	160 - 240
MEF3605	EF3605	895*1,524	260	240 - 360
MEF3606	EF3606	895*1,829	260	240 - 360
MEF4806	EF4806	1,200*1,892	330	460 - 650
MEF6006	EF6006	1,524*1,892	500	500 - 700

- Data for marketing purposes subject to change with product upgrades. Please consult TRIO for your customized solutions.

Apron Feeder Modules

Apron Feeders are slow moving, positive displacement feeders which can be widely applied in the mining, aggregate and industrial minerals industries. They offer customers a cost effective solution when feeding even the most difficult materials. These feeders are especially effective in applications that have large rock with sharp edges, materials that are sticky or hot materials.

Apron Feeder Modules				
Model	Main Equipment Model	Deck Width (MM)	Gradation (MM)	Capacity (MTPH)
MAF18 Series	TAF18 Series	1,800	≤800	≤1,000
MAF20 Series	TAF20 Series	2,000	≤900	≤890
MAF24 Series	TAF24 Series	2,400	≤1,102	≤1,000

- Inclined angel≤23°
- Data for marketing purposes subject to change with product upgrades. Please consult
- TRIO for your customized solutions.

Modular Jaw Crusher Stations

TRIO has many years' of experience designing and manufacturing jaw crushers.Our CT-Series Jaw Crushers are the perfect combination of quality, reliability and outstanding performance.

We offer a complete range of jaw crushers that can be widely applied in the mining, aggregate, recycling and industrial mineral industries, offeringhigh performanceprimary crushing.

Our extensive range of pre-engineered primary crushing stations provide optimized solutions with numerous feed hopper designs and capacitiesthat enable these stations to be matched with the customer' s preferred loading and haulage equipment.

TRIO designs include both sloped side and rock box style hoppers in a variety of configurations. Safe and accessible work platforms are built with grated walkways, stairways, handrails,knee rails and toe plates. These features can be tailored to satisfy local dimensional requirements.

Optional hydraulic breaker modular support structures can be pair with these primary stations to effectively manage oversized feed. Operator control rooms or towers can also be supplied as stand-alone control modules or as extensions to overall plant motor control centers.

Model	Main Equipment Model	Size (MM)	Feeding Size	Discharge Size Range (MM)	Max Feeding Size (MM)	Capacity (MTPH)	Hopper Volume	Feeder	Hopper Size (MM)
MJ1252	CT1252	7,066*1,939*3,443	300*1,320	25-89	250	50-135	8M³ *	TF2012 single deck vibrating grizzly feeder	1,000*3,650
MJ2436	CT2436	9,850*2,120*5,073	610*910	76-178	500	120-349	6M³	TF4016 single deck vibrating grizzly feeder	1,000*4,875
MJ2042	CT3042	11,804*4,080*6,216	760*1,070	76-203	610	150-503	19.7M³	TF4026 vibrating grizzly feeder (single or double deck optional)	1,124*6,000
MJ3254	CT3254	15,340*7,470*9,623	800*1,370	50-180	650	240-780	51.5M³	TF5220 vibrating grizzly feeder (single or double deck optional)	1,300*6,000
MJ4254	CT4254	15,380*5,470*10,948	1,060*1,370	125-275	960	400-1,100	14M³	TF5820 vibrating grizzly feeder (single or double deck optional)	1,625*6,000
MJ4763	CT4763	18,314*8,704*12,759	1,200*1,600	150-300	1075	520-1,250	35M³	TF6420 vibrating grizzly feeder (single or double deck optional)	1,625*7,320

1.Size=length* width*height
2.Data for marketing purposes subject to change with product upgrades
3. Hydraulic hammer and lighting equipment can be installed according to customers' need.
4. Larger feeding hopper can be installed according to customers' need and working condition requirement.

Modular Cone Crushers

TRIO's TC-Series Cone Crushers unitize a time proven design platform that has been optimized with robust mechanical components and labor saving user friendly operating features. The TC-Series Conesare a combination of quality, performance and reliability for secondary and tertiary crushing applications.

These crushers have large cone head diameters, which allow a medium-speed increase to equal the linear velocity and processing capacity of high-speed crushers in the market.

Our larger socket assembly delivers full support under both extreme and light load conditions, providing an extended crusher service lifeeven in the most difficult operatingconditions.

TRIO' s secondary and tertiary modular cone structures are supplied as stand-alone modules or matched with surge bins using pan or belt feeders. All TRIO cone modules includevibrationisolation,with a floating crusher sub-frame that supports the crusher, drive system and motor guard.

Our cone modules have convenient and easily accessibleunder crusher inspection access along with safe work platforms and stairways that can be tailored to satisfy local code requirements.

Model	Main Equipment Model	Size (MM)	Feeding Size Range (MM)	Discharge Size Range (MM)	Capacity (MTPH)
MTC36	TC36H S	2,985*1,400*4,870	100 - 180	9 - 40	27 - 186
	TC36H SH	2,985*1,400*4,870	40 - 75	3 - 22	27 - 136
MTC51	TC51H S	3,751*1,850*5,871	140 - 260	12 - 50	136 - 425
	TC51H SH	3,751*1,850*5,871	65 - 135	3 - 25	36 - 255
MTC66	TC66H S	4,661*1,650*7,522	210 - 370	19 - 63	132 - 565
	TC66H SH	4,661*1,650*7,522	70 - 150	5 - 25	105 - 380
MTC6	TC6	6,514*2,160*9,294	70 - 360	10 - 64	200 - 1,000
MTC84	TC84	6,514*2,215*9,360	70 - 460	10 - 64	300 - 1,500

* Size=Length*width*height
* S=standard SH=short head
* Max feeding material size is 80% of the F.O.R (Feeding Opening Range) matching your liner selection.
* All standard and short head models can be equipped with chambers for extra-coarse, coarse, medium and fine material
* Data for marketing purposes subject to change with product upgrades. Please consult TRIO for your customized solutions.

Modular Primary and Secondary Impact Crushers

TRIO offers two configurations of horizontal shaft impactcrushers: The APP-Series for high-production primary crushing and the APS-Series forsecondary crushing or recycling applications. All of our horizontalimpactor' s are equipped with solid cast steel or fabricated stress relieved rotors in 2,3 or 4 row blow bars configurations. Extra-heavy duty rotors provide the mass and strength necessary when crushing tough materials. These high capacity, large reduction ratio crushers are ideal for the aggregate, cement and limestone industries.

Our extensive range of pre-engineered modular primary and secondary impact crusher stations include. Numerous feed hopper designs and capacities that enable these stations to be matched with the customers' loading and haulage equipment. TRIO designs include both sloped side and rock box style hoppers.

Safe and accessible work platforms are built with grated walk ways, stairways, hand rails and toe plates that can be tailored to satisfy local dimensional requirements. Operator friendly stairs are provided to ensure user maintenance and service access.

Hydraulic breaker modular support structures are available in these primary stations to effectively manager oversize feed. Operator control rooms and towers can also be supplied as stand- alone control modules or as extensions or overall plant motor control centers.

Model	Main Equipment Model	Weight (KG)	Feed Hopper Weight (KG)	Feed Height (MM)	Length (MM)	Width (MM)	Capacity (MTPH)	Power (KW)	Rotor Size (MM*MM)
MIS3030	APS3030	3673	3300	4250	2956	1246	20-65	55	760*760
MIS4034	APS4034-F	9490	2069	5021	8593	4403	80-150	90-110	1,000*800
MIS4054	APS4054	6072	4692	5255	4002	1246	120-200	90-110	1,000*1,370

- Data for marketing purposes subject to change with product upgrades. Please consult TRIO for your customized solutions.

Modular Vertical Shaft Impact Crushers

TRIO’ s vertical shaft impact crushers utilize the mostadvance design platform, making it the VSI crusher with thewidest range of capabilities in the market. TV series crushersare tertiary or fine-stage crushers, which can be utilized inthe most demanding applications to process many types of ores, minerals and aggregates. These impact crushers can provide fine crushingsolutions for aggregate, manufactured sand, industrial mineral powders, or pre-grinding for ore milling circuits.

Our VSI crushers use high-speed rotors or heavy duty open tables. All TRIO VSI crushers are convertible between 3 styles of crushing chamber designs for maximum flexibility. Configuration options include open shoe table and anvil ring, enclosed rotor and anvil ring, and enclosed rotor and rock shelf. These configurations maximize flexibility and allow the crusher to be configured as needed for the highest performance possible.

Modular Vertical ShaftImpact Crusher Stations include feedboxes and discharge chutes that incorporate dust control plenums. Convenient accessible work platformsand stairways provide operator safetyand ensure simple service and maintenance.

Model	Main Equipment Model	Size (MM)	Main Frame Diameter (MM)	Max Feeding Size (MM)	Capacity (MTPH)	Rotor Size (MM)	Rotor Typer	Chamber Type
MV85	TV85 - ROR - SD	3,816*1,225*5,936	2,100	50	150-250	890 or891	5 enclosed rotor (7 optional)	Rock Shelf
	TV85 - ROR - DD	3,816*1,225*5,936	2,100	50	150-250	813or891	5 enclosed rotor (7 optional)	Rock Shelf
	TV85 - ROS - SD	3,816*1,225*5,936	2,100	38	100-250	890	6 enclosed rotor	Anvil Ring
	TV85 - ROS - DD	3,816*1,225*5,936	2,100	38	100-300	890	6 enclosed rotor	Anvil Ring
	TV85 - SOS - SD	3,816*1,225*5,936	2,100	90	100-300	810or1,070	4 open shoe table (6 optional)	Anvil Ring
	TV85 - SOS - DD	3,816*1,225*5,936	2,100	90	100-400	810or1,071	4 open shoe table (7 optional)	Anvil Ring
MV95	TV95 - ROR - SD	3,816*1,225*5,936	2,400	63	150-350	813or891	5 enclosed rotor (7 optional)	Rock Shelf
	TV95 - ROR - DD	3,816*1,225*5,936	2,400	63	220-450	813or891	5 enclosed rotor (7 optional)	Rock Shelf
	TV95 - ROS - SD	3,816*1,225*5,936	2,400	63	100-350	890	6 enclosed rotor	Anvil Ring
	TV95 - ROS - DD	3,816*1,225*5,936	2,400	63	180-600	890	6 enclosed rotor	Anvil Ring
	TV95 - SOS - SD	3,816*1,225*5,936	2,400	125	100-300	810or1,070	4 open shoe table (6 optional)	Anvil Ring
	TV95 - SOS - DD	3,816*1,225*5,936	2,400	125	100-500	810or1,071	4 open shoe table (7 optional)	Anvil Ring

* Size=length*Width*Height
* SD=single drive; DD=Double drive
* ROR= rock on rock; ROS=rock on steel; SOS=steel on steel

Modular Inclined Screen Structures

TRIO' s wide range of vibrating inclined screen sizes paired with an equally wide range of modular structure configurations results in a comprehensive selection of modular inclined screen stations. Standard configurations include feed boxes, rock ladder type or lined sloped discharge chutes and under-screen fines hoppers. Options include fixed or roll-away chutes with bolt-on alternate discharge points, wet-screen kits, slurry recovery hoppers, alternative tower heights, and stations that accommodate multiple screens.

Safe and accessible work platforms are built with grated walkways, stairways, hand rails, knee rails and toe plates that can be tailored to satisfy local dimensional requirements. Operator friendly stairs are provided to ensure user maintenance and service access.

Model	Main Equipment Model	Weight (KG)	Discharge Conveyor	Feed Height (MM)	Length (MM)	Width (MM)	Discharge Height(MM)
MSI4102	TIOSP4102	10,748		8,136	6,533	5,446	2,247
MSH4102	TIH4102A	2,566	●	4,709	4,665	2,158	1,522
MSI5142	TIO5142	13,844		8,901	7,742	7,894	1,506
MSI5143	TIO5143A	9,447		6,951			
MSI5162	TIO5162A	10,080		6,423	8,480	3,771	1,295
MSI5163	TIOSP5163	13,495		6,952	8,100	3,697	1,500
MSI6162	TIOSP6162	8,420		6,334	7,860	4,010	1,959
MSI6163	TIOSP6163	13,078		8,192	10,309	4,076	1,905
MSI6203	TIO6203A	15,551		9,436	11,220	5,467	950
MSI7203	TIO7203C	13,865	●	9,713	9,991	4,587	1,546
MSI7243	TIO7243	12,797		8,501	9,717	4,300	1,208
MSHA8203	TIO8203FA	17,688	●	10,821	10,549	4,860	2,049
MSI8204	TIO8204A	20,434	●	10,276	11,649	4,896	1,582
MSI8243	TIO8243B	14,480	●	9,205	11,426	4,896	1,612

* All models are able to install washing equipment
* Flaps on discharge hopper and number of decks are optional subject to customers need and requirement
* Data for marketing purposes subject to change with product upgrades. Please consult TRIO for your customized solutions.

Modular Horizontal Screen Structures

TRIO' s Horizontal Screens generate their power via 3 timed shafts with eccentric counterweights. The three shafts provide an aggressive oval stroke with adjustable amplitude, speed and operating angle. All of our horizontal screens can be installed into modular stations, providing customers with wide range of modular screening solutions. Standard configurations include feed boxes, rock ladder type or lined sloped discharge chutes and under-screen fines hoppers. Options include fixed or roll-away chutes with bolt-on alternate discharge points, wet-screen kits, slurry recovery hoppers, alternative tower heights, and stations that accommodate multiple screens.

Model	Main Equipment Model	Weight (KG)	Discharge Conveyor	Feed Height (MM)	Length (MM)	Width (MM)	Discharge Height(MM)
MSHP5162	TTHSP5162	8,643	●	4,676	8,159	4,220	1,620
MSH5162	TTH5162A	4,866		4,527	7,300	3,476	2,000
MSH5163	TTH5163B	9,182		6,415	9,394	4,313	1,400
MSHP6162	TTHSP6162F	9,782	●	5,244	8,955	4,588	1,667
MSH6202	TTH6202B	9,865	●	4,790	10,101	4,528	1,918
MSH6203	TTH6203B	9,800	●	5,196	10,101	4,528	1,668
MSH6203	TTH6203A	12,955 12,317		7,368	10,376	9,193	3,494
MSH7202	TTH7202A	10,576		5,665	9,319	4,993	1,600
MSH8202	TTH8202BL	29,314	●	8,009	10,019	13,385	5,301
MSH8203	TTH8203FT TTH8203FTL	50,368	●	10,891	10,510	11,242	4,220
MSHC8203	TTHC8203F*2	36,405	●	8,408	11,426	11,426	3,910
MSH9203	TTHM9203	14,906	●	7,965	10,031	8,715	1,800

* All models are able to install washing equipment
* Flaps on discharge hopper and number of decks are optional subject to customers need and requirement
* Data for marketing purposes subject to change with product upgrades. Please consult TRIO for your customized solutions.

Modular Washing Stations

TRIO log washers are ideal for scrubbing difficult materials. Tough insoluble clays, conglomerates, soil stone and cemented aggregates are difficult to clean in normal screw washers. The maximum feed size is up to 100mm.The log washer scours, breaks down and cleans the toughest materials, providing an excellentwashing solution.

Coarse material washers are ideal tools to clean, classify and dewater crushed stone and gravel nominally sized less than 2-1/2 (65mm) inches and larger than 3/8" (10mm).Theunits cast paddles provide a highly abrasive washing actionthat separates aggregates from dust, soluble clay, and organicparticles producing high quality aggregate used in construction and concrete. These coarse washers feature a stable transmission, advanced blade designand reliable sealing system.

Our fine material sand screws are designed for dewatering, washing and classification of sand. With adjustableoverflow weirs, the sand screws enable operators to controlthe depth of the head and velocity of overflow waste water.The large overflow feed box allowsfor the retention of finermesh minerals, or, if necessary, the removal of those particles.These fine material washers are built with a large3-stage gearbox for reliable power transmission and effectively sealed to ensure long-term operation.

Fine Material Washer			
Single Spiral		Double Spiral	
Model	Size（MM）	Model	Size（MM）
TSW3625	915*7,620	TTSW3625	915*7,620
TSW4432	1,115*9,700	TTSW4432	1,115*9,700
TSW5434	1,370*10,010	TTSW5434	1,370*10,010
TSW6636	1,676*10,670	TTSW6636	1,676*10,670

Coarse Material Washer			
Single Spiral		Double Spiral	
Model	Size（MM）	Model	Size（MM）
TBW3618	928*5,450	TTBW3618	928*5,450
TBW4420	1,118*6,350	TTBW4420	1,118*6,350
TCW3618	928*5,450	TTCW3618	928*5,450
TCW4420	1,118*6,350	TTCW4420	1,118*6,350

Log Washer			
Single Spiral		Double Spiral	
Model	Size（MM）	Model	Size（MM）
LW3630	905*8,650	LW4430	1,120*8,650
LW3635	905*10,500	LW4435	1,120*10,500

* TBS Fine washer is configurated with blade and spiral
* Data for marketing purposes subject to change with product upgrades. Please consult TRIO for your customized solutions.

Modular Mounted Magnets

TRIO modular magnet stations are available for both manual and self-cleaning permanent magnets and electro-magnets. Alternative mounting heights and cable orchannel mounting systems facilitate installation of magnets in any location required in a plant.

Permanent Magnet					
Self-cleaning	CRP30	CRP36	CRP42	CRP48	CRP54
Stationary	CRPS30	CRPS36	CRPS42	CRPS48	

Electro Magnet Self-cleaning Stationary						
Self-cleaning	CRP36	CRP42	CRP48	CR54	CR60	CR66
Stationary	CRPS36	CRPS42	CRPS48	CRS54		

* Adjustable with requirement and demand

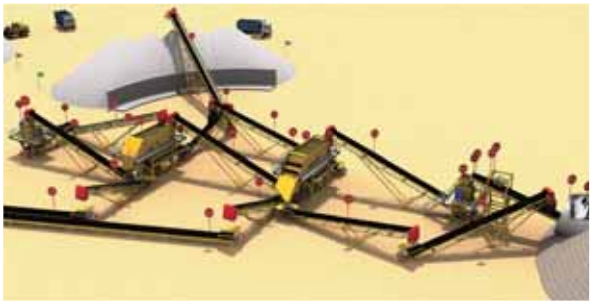
Conveyors

TRIO manufactures a complete line of conveyors to meet the demanding needs of the mining, aggregate and industrial minerals industries. Our conveyor configurations include truss, channel, and combination frame styles for transfer conveyors, radial stackers, telescoping stackers,and jump or grasshopper conveyors. Overland and tunnel conveyors are available in truss, channel, and suspended catenary styles.

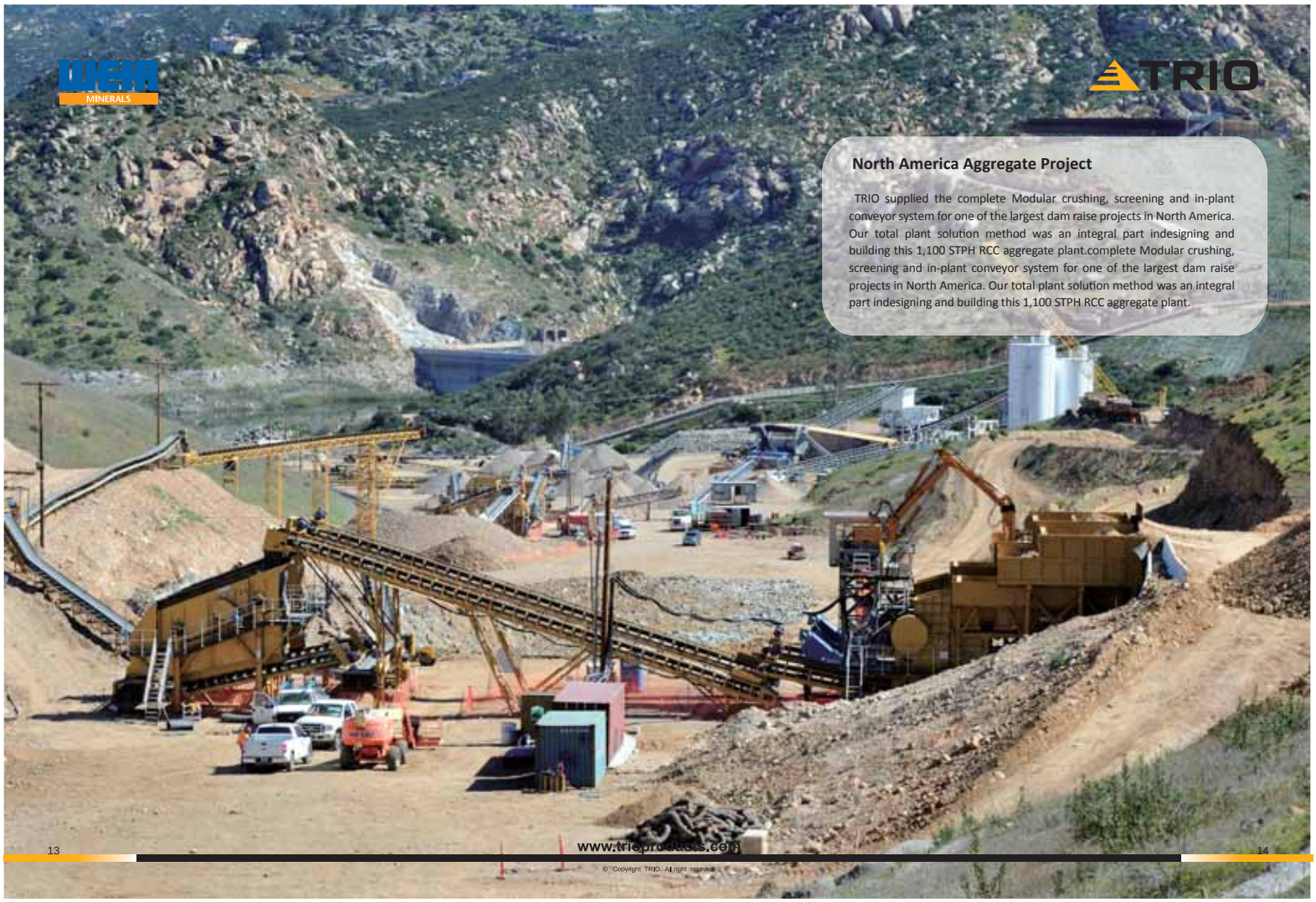
Our conveyors can be customized with many options including walkways, head platforms, e-stops, beltcleaners, backstops, folding heads, discharge chutes, CEMA B, C or D idlers. Other options include customer specified bearings, drive and belting.

TRIO supplied the complete Modular crushing, screening and in-plant conveyor system for this Mega Dam Raise Project.

OurTotal Plant Solution methodwas used to build the largest modular aggregate plant installed in North America during 2010.



This plant operated at 1,100 STPHproducingaggregate for Roller Compacted Concrete used to raise an existing dam and make it one of the largest in the world.

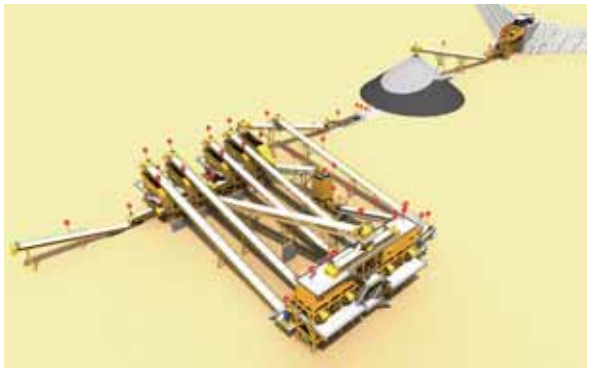


North America Aggregate Project

TRIO supplied the complete Modular crushing, screening and in-plant conveyor system for one of the largest dam raise projects in North America. Our total plant solution method was an integral part indesigning and building this 1,100 STPH RCC aggregate plant.complete Modular crushing, screening and in-plant conveyor system for one of the largest dam raise projects in North America. Our total plant solution method was an integral part indesigning and building this 1,100 STPH RCC aggregate plant.

Iron ore project in Mongolia

TRIO supplied the complete modular crushing, screening and in-plant conveyor system for this iron ore processing plant.



Another illustration of our Total Plant Solutions methodis this iron ore processing plant. TRIO supplied the modularprimary, secondary and tertiary crushing stations andhorizontal screeningmodules.

This plant design began a with mass balance flow diagram, then progressed through both 2D and 3D plant layouts and was completed with comprehensive set of engineered drawings.

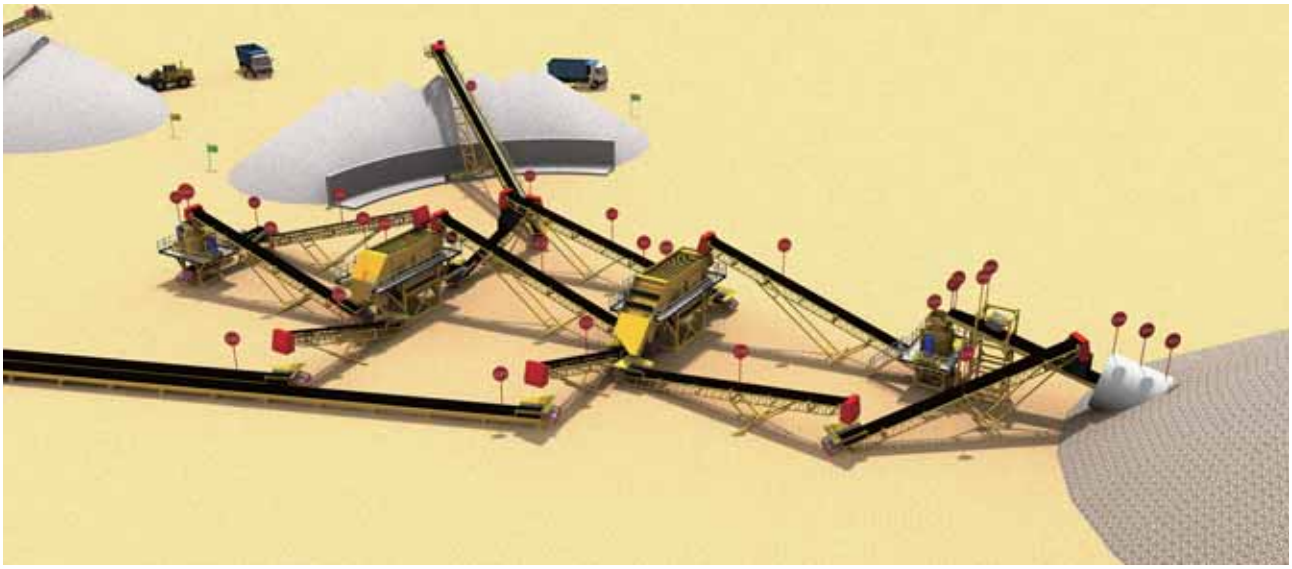
The project included amagnet separation station, conveyors inmultiple configurations and the central control room forefficient operation and supervisory control.

All modular stations were manufactured and pre-assembled in theirentirety before shipping directly to the job site, insuring an accurate and efficient on site assembly in thisremote and hostile environment.

Comprehensive Optimized Solutions

TRIO can provide not only key single machines, but also complete crushing, screening, washing, and material conveying solutions. We take your budget, working environment, capacity and product gradation requirements into consideration to provide a customized solution. Our optimized solutions include machine model selection, operating simulation, and on-site layout drawing.

These outstanding designs, engineering and manufacturing capabilities, together with complete after-sales service, will ensure the successful implementation of your project, creating value and achieving your objectives.



Worldwide Parts and Service Support

From Europe to mid-Asia, Africa to America, China to Australia, no matter what you order (a complete system, single machine, or a spare part). TRIO will provide you with professional service and support.

Combined with off-the-shelf availability, global distribution and superior quality, TRIO replacement parts and skilled service personnel make TRIO a valued partner in the global mining and aggregate industries.

All TRIO products are assembled and test run in our factory to ensure reliable performance. We also provide professional training for customer maintenance and operations personnel to insure smooth and efficient plant operations along with safe and simple maintenance.

CRUSHERS

CT Series Jaw Crusher
TC Series Cone Crusher
APS& APP Series Impact Crusher
TV Series VSI Crusher

Screens

TIH, TIO&TIOSP Series Inclined Screen
TTH Series Horizontal Screen
TBSS& TBSD Series Banana Screen

Portable Plants

Track mounted portable plants
Wheel mounted portable plants

Plant Solutions

'Turn-key' projects

TRIO - US

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Report 2
Environmental Risk Assessment

SSQ BESPOKE MATERIALS RECYCLING FACILITY, LLANWERN

Appendix 2
WAMITAB Certificates

Report Number 2473r2v2d1224

CIWM

Continuing Competence Certificate

This certificate confirms that

James Davis

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 17/10/2024

LH	Landfill - Hazardous Waste
TSH	Transfer - Hazardous Waste
TMH	Treatment - Hazardous Waste

Expiry Date: 17/10/2026

Verification date: 14/10/2024

Authorised:

Responsible Officer

Learner ID: 25434

Certificate No.: 5264700

Date of Issue: 17/10/2024

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

Scan code on reverse to authenticate that this is a genuine paper

wamitab

Certificate No: 13538

CERTIFICATE OF TECHNICAL COMPETENCE

This Certificate confirms that

James Davis

Has demonstrated the standard of technical competence required for the management of a facility of the type set out below

Facility Type

Level 4 in Waste Management Operations -

Managing Treatment Hazardous Waste (4TMH)

Authorising Signatures:

Chief Executive Officer

Director:

Date of issue: 07 November 2014

00020629

wamitab

Certificate No: 13537

CERTIFICATE OF TECHNICAL COMPETENCE

This Certificate confirms that

James Davis

Has demonstrated the standard of technical competence required for the management of a facility of the type set out below

Facility Type

Level 4 in Waste Management Operations -

Managing Landfill Hazardous Waste (4LH)

Authorising Signatures:

Chief Executive Officer

Director:

Date of issue: 07 November 2014

00020630

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