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EXISTING DEVELOPMENT

2.1 The proposed backfilling and restoration of the North and West Quarries at Huntstown, for which planning permission was obtained in August 2014 (Fingal County Council Ref. No FW12A-0022, An Bord Pleanala Ref. No. 06F.241693) provides for the importation of inert naturally occurring materials, principally excess soil, stones and/or broken rock from nearby construction and development sites, to backfill and restore existing voids created by the previous extraction of soil and/or bedrock back up to original ground level.

2.2 As backfilling and restoration of quarry voids with imported soil and stone is also designated a waste recovery activity, the activity also requires a waste licence from the Environmental Protection Agency (EPA). The waste licence in respect of the existing waste recovery facility at Huntstown (Ref. No. W0277-01) was issued in February 2015 and, in addition to providing for the recovery of soil and stone through backfilling on land, also provides for the following:

- Use of dedicated waste infrastructure and/or shared use of existing infrastructure with the established aggregate, concrete and asphalt production businesses which are co-located at the quarry;
- separation of non-inert C&D waste (principally metal, timber, PVC pipes and plastic) unintentionally imported to the facility prior to its removal off-site (to appropriately licensed waste disposal or recovery facilities);
- restoration of the backfilled voids (including placement of cover soils and seeding) and theirits return to agricultural grassland; and
- ongoing environmental monitoring of noise, dust, surface water and groundwater for the duration of the soil recovery / quarry backfilling works and for a short period thereafter.

2.3 The existing quarry voids are being infilled using only inert soil and stone excavated at and imported from pre-approved external construction and development sites. Excess soil stockpiled in existing overburden mounds around the quarries will also be used to backfill the quarry voids. No peat, contaminated soils or non-hazardous waste is accepted at the existing inert waste recovery facility.

2.4 Relatively minor quantities of aggregate are imported to the recovery facility for use in the construction of temporary haul roads across the imported soil and stone as the quarry voids are filled. The layout of the existing recovery facility at Huntstown is outlined in Figure 2-1. Details of the previsouly approved restoration scheme for the entire quarry complex at Huntstown which provides for the backfilling of all existing quarries are provided in Figure 2-2, with relevant cross-sections through the North and West quarries provided in Figures 2-3 and 2-4.

PROPOSED DEVELOPMENT

2.5 The 2014 planning permission which provides for the backfilling of all existing and/or planned quarries at Huntstown (including the North Quarry and West Quarry) was granted on the basis of a maximum projected soil and stone waste intake rate of 750,000 tonnes per annum. The existing waste licence applies a restriction on soil and stone waste intake to the recovery facility, and also limits it to a maximum of 750,000 tonnes per (calendar) year.

2.6 In view of significant market demand (discussed in Chapter 1 of this EIS), Roadstone proposes to increase the annual maximum intake at the recovery facility, from 750,000 tonnes per year currently to 1,500,000 tonnes per year.

2.7 The proposed development will essentially comprise an intensification of soil and stone waste recovery activities at the Huntstown facility, over and above that which has already been approved.

2.8 The very strong market demand for soil waste recovery generated by the lift in construction and development related activities around Dublin in early 2016 meant that the rate of soil waste intake and acceptance at the facility over the first three to four months of 2016 was broadly comparable to that for which planning permission in now being sought (approximately 6,250 HGV loads brought to site per month).

2.9 Roadstone identified at that time that the facility at Huntstown had the capacity to physically accommodate the increased rate of waste importation without any significant adverse operational or environmental impacts (other than some delay as HGVs queued along internal haul roads within its property to be weighed in at the weighbridge). The company does not therefore consider there to be any requirement for it to provide additional physical infrastructure at the recovery facility to accommodate the increased waste intake.

2.10 In light of the intensive rate of intake earlier in 2016 and notwithstanding a number of measures taken to limit or restrict waste intake to the facility in recent months, Roadstone has had to suspend waste intake to the recovery facility for 2016 as it reached its permitted maximum annual intake limit (of 750,000 tonnes) in late July. The facility is currently expected to resume waste intake and recovery after 1 January 2017.

2.11 In order to assist in the identification and assessment of impacts associated with the proposed intensification of recovery activities at Huntstown, details are provided below of existing waste facility infrastructure, waste operations and procedures and arrangements for environmental controls and monitoring.

EXISTING SITE INFRASTRUCTURE

Site Access

2.12 Existing vehicular access into the waste recovery facility and other established businesses within the Huntstown quarry complex is via an extended internal paved access road which runs from east to west and leads off the R135 Regional Road, known locally as the North Road (the former N2 National Primary Road between the M50/N2 Interchange at Finglas and Kilshane Cross). Aside from the access road, the Roadstone property boundary is closed off by post and wire fencing and/or hedgerow. There is no other access into the quarry complex.

2.13 A plan showing current internal traffic routing to the recovery facility is presented in Figure 2-5. As can be seen, within the quarry complex, all heavy good vehicles (HGVs) importing inert soil and stone facility turn right and north at a T junction immediately east of the central infrastructure / production area. HGV traffic then continues north along a section of internal paved road which runs along the eastern side of the central infrastructure area, passing over a weighbridge and past the waste facility / weighbridge office, before continuing north over a further short section of paved road before then running onto an

unpaved section of road and turning through 180° to head south back to the active backfilling area the North Quarry.

Site Security

2.14 Inert materials are accepted at the waste recovery facility between 07.00hours and 18.00hours each weekday (Monday to Friday) and on Saturdays, as required by by Condition 1.7 of the existing waste licence (Ref. W0-277-01). No materials are accepted at any other time including Sundays and Public Holidays.

2.15 All access to the quarry, production facilities and recovery facility is controlled by a manned security post along the access road leading off the R135 North Road. The post is manned by security staff on a 24 hour, 7 day a week basis.

Site Roads, Parking and Hardstanding Areas

2.16 Provision for employee and visitor car parking is currently provided on paved ground surrounding the waste facility / weighbridge office or around the main office building at the central infrastructure area.

2.17 Much of the access road to the recovery facility and car parking areas is sealed by concrete or asphalt surfaces which will remain in place for the duration of the waste recovery activities. There are also extensive permanent concrete hardstanding surfaces located around production facilities in the central infrastructure area. Surface water falling across these surfaces drains via existing drainage networks and on-site settlement ponds to a tributary stream of the Ward River, to the north of the central infrastructure area.

2.18 In other areas within the application area, there are unpaved hardstanding areas around the quarry voids. Rain falling across these areas either percolates downwards into the underlying soil / bedrock or runs-off over the existing ground surface, into the existing quarry voids. These unpaved hardstanding areas are occasionally used for the storage of site plant, equipment and/or materials required at the waste recovery facility.

Traffic Control

2.19 Internally, within the Huntstown Quarry Complex, direction signs, warning notices and speed restriction signs are in place along paved roads leading to and from the central infrastructure and production area and the waste recovery facility.

Wheelwash

2.20 In order to prevent transport of soil out of the recovery facility onto public roads, an existing wheelwash facility is provided for all exiting HGV's along the paved road which runs out to the R135 North Road. The location of the wheelwash is indicated in the facility layout plan shown in Figure 2-1.

Weighbridge

2.21 In order to track and record the amount of material entering the application site, all HGV traffic importing soil and stones to the waste recovery facility is directed across an existing weighbridge along the internal haul road leading to the recovery area. Any separated non-inert construction and demolition waste dispatched (in skips) to other licensed waste disposal or recovery facilities is also weighed out at the weighbridge.

2.22 Records of imported soil tonnage are maintained for waste auditing purposes. At the weighbridge office, HGV drivers carrying soil and stone waste to the recovery facility identify themselves to site staff before proceeding to the active backfilling area(s). Site staff take a copy of the weigh docket, record the time and date of arrival, the nature and origin of the imported soils, the customer / client, the truck licence plate number and relevant waste collection permit details.

2.23 CCTV cameras are installed around the weighbridge and used to inspect all soil and stone waste being imported for recovery purposes. The CCTV images are relayed in real time to the weighbridge office where can be viewed by site staff.

Fuel and Oil Storage

2.24 Fuel for plant and equipment used at the recovery is stored in existing fuel storage tanks at the central infrastructure and production area within the Huntstown facility. These tanks are constructed on sealed concrete surfaces and bunded to provide a storage volume equivalent to 110% of the tank storage volume. The mobile plant and equipment undertaking the quarry backfilling works is refuelled over concrete surfaces around the fuel storage tanks and on occasion, from mobile, double skin fuel bowsers.

2.25 Plant maintained on site principally comprises mechanical excavators and/or bulldozers. Oil and lubricant changes and servicing of wheeled or tracked plant is undertaken at the existing maintenance sheds. A small bunded area for waste oils is provided within the maintenance shed. Oil collected in tanks is emptied at intervals by a licensed waste contractor and disposed off-site at an authorised waste facility.

Waste Inspection and Quarantine Area

2.26 Any imported waste which, it is suspected, may not comply with waste acceptance criteria for the waste recovery facility, is transferred across the application site to a pre-existing covered structure beyond the south-eastern corner of the North Quarry (refer to the facility layout plan in Figure 2-1). This shed is constructed over a sealed concrete slab. It serves as the dedicatedq waste inspection and quarantine facility for the waste recovery operation.

2.27 Visual inspection, in-situ monitoring and testing of imported waste materials is undertaken by site staff as inert waste materials are end-tipped at the active backfilling areas.

2.28 In the unlikely event that suspected contamination of the soil matrix is subsequently identified during the spreading, placement and compaction operations, it will be segregated from the main waste body and transferred to the covered waste inspection and quarantine facility pending closer inspection and testing to establish whether it is inert or not. Suspect waste will be identified on the basis of visual inspection (unusual colour, intermixed wastes etc) or by smell. Detailed records will be kept of all inspections and testing of suspect wastes.

2.29 Should inspections and/or testing of suspect soil and stone wastes at the inspection and quarantine facility indicate that they are non-inert and cannot be accepted and used for restoration purposes at this facility, they will be placed in skips and/or covered pending removal off-site by permitted waste collectors to a suitably permitted (or licensed) waste disposal or recovery facility.

2.30 Provision will also be made for temporary storage of any separated non-inert construction and demolition waste (including metal, timber, plastic etc.) in skips prior to removal off-site to a licensed recovery facility.

Sewerage and Surface Water Drainage

2.31 Site staff at the Huntstown soil and stone waste recovery facility use toilet, hand washing and welfare facilities provided at the main site offices and staff canteen.

2.32 The only surface water drainage infrastructure at the site exists across the central infrastructure area where aggregate processing and concrete production activities are currently concentrated. Rain falling across the remainder of the recovery facility either

- runs over unsealed ground into the existing quarry void and a small pond on the eastern side of the quarry floor
- percolates down through the existing soil / rock at the ground surface as recharge to groundwater, at which point it joins groundwater flow toward the quarry face / floor.

2.33 At the present time, groundwater levels at the North Quarry are lowered by means of sumps in the quarry floor. Surface water run-off and dewatered groundwater are collected in the pond on the quarry floor and pumped to the ground surface via an existing pipe network.

2.34 The depth of overburden stripping and removal at the West Quarry is typically 2m-3m, some distance above the groundwater table which has been depressed by dewatering at the adjacent North and South quarries. Although much of the rainfall over the West Quarry recharges into underlying rock, a small proportion of it runs over ground to ponds which formed at low points and/or at closed depressions (which are likely to be self-sealed with fine silt and/or sediment). Surface water run-off in these ponds is occasionally pumped across an internal haul road, to sumps at the North Quarry and re-used for dust suppression.

Surface Water Management : Waste Inspection and Quarantine Area

2.35 As previously outlined, any suspect contaminated waste imported to the proposed waste facility is transferred to a covered shed beyond the south-eastern corner of the North Quarry. As the floor of the shed is sealed by a concrete slab, and as no rainfall will come into contact with consignments of suspected contaminated waste, there is no requirement to install drainage infrastructure for the separate collection and storage of potentially contaminated surface water run-off at the waste inspection and quarantine facility.

Surface Water Management during Quarry Backfilling

2.36 During the infilling operations, the upper surface of the backfilled soil is graded so as to ensure that surface water run-off falling over the quarry footprint falls to sumps at temporary low points within the quarry floor or backfilled material. These temporary sumps will effectively function as primary settlement ponds and water collecting in them is pumped (causing minimum agitation to ponded water) to the existing drainage channel / watercourse on the eastern side of the North Quarry. Water pumped to this channel is routed via settlement ponds and existing treatment infrastructure (silt trap and hydrocarbon interceptor) prior to discharge to a tributary stream which runs northwards toward the Ward River. The configuration of the existing surface water management system is indicated on the site infrastructure layout in Figure 2-6.

Site Accommodation

2.37 All administration and management functions for the waste recovery facility are based at the dedicated waste facility office / weighbridge office adjacent to the weighbridge. Staff changing, washing and cooking facilities are provided separately at the main canteen facility at Huntstown, located to the east of the main office and weighbridge.

Site Services

2.38 Electric power, lighting and heating are all currently provided via the electricity network to existing site offices and staff welfare facilities at Huntstown.

2.39 Site staff overseeing backfilling and recovery operations at the application site are contactable by mobile phone. Site staff are also contactable by fixed line telephone, fax and email facilities available at the waste facility office.

2.40 There are currently toilets, washbasins and sink units at the main offices in the central infrastructure area at Huntstown Quarry. There are further toilets, washbasins and sink units at the canteen facility. Wastewater from both these locations is currently collected and fed via a sewerage pipe to an on-site wastewater treatment plant (septic tank).

2.41 A potable water supply is provided to the main site office and canteen via a Local Authority water main.

2.42 High voltage overhead electricity transmission cables (110kV and 220KV) run to the east and south-west of the recovery facility, to and from the electricity substation north-west of the M50/N2 Interchange. Lower voltage overhead cable and telephone cables also run across the Huntstown Complex.

2.43 A gas pipeline runs to the nearby electricity generating plant operated by Huntstown Power (Viridian). This pipeline runs to the north-east of Roadstone Wood's landholding and does not cross the waste recovery facility nor the application site.

Plant Sheds and Equipment Compounds

2.44 Plant and equipment used in the quarry backfilling and soil recovery activities will be stored at the application site or on the sealed hardstand area in the centre of the Huntstown Complex. Given the existing restriction on access into the Huntstown Complex, it is not considered necessary to provide a secure compound for plant and equipment servicing the waste recovery facility.

2.45 Any plant or equipment requiring specialist repair or overhaul will be taken to the existing maintenance sheds within the Huntstown Complex. Small items of mobile or hand-held plant and equipment will also be stored as required in the existing maintenance sheds

EXISTING WASTE OPERATIONS AND PROCEDURES

2.46 The backfilling of the existing quarry voids with inert soils and stone is deemed to constitute inert waste recovery through deposition for the purposes of land improvement or restoration. The restoration and backfilling scheme indicated for the Huntstown quarries provides for direct use of the imported soil and stone, without further processing.

Backfilling / Restoration Scheme

2.47 Backfilling of the Huntstown North and West quarries using imported inert soil and stone waste will extend from the quarry floor level up to their original (former) ground level. On completion; the backfilled quarries will be initially returned to agricultural use, most likely as grassland, in keeping with some of the surrounding pastoral landscape. Details of the planned restoration scheme and the final ground level contours are provided in plan in Figure 2-2. Cross-sections through the final landform are provided in Figures 2-3 and 2-4.

2.48 In addition to imported materials, some soil and stone in existing screening berms and/or stockpiles across the existing site will also be used to backfill the quarries.

2.49 Backfilling of the existing void at the North Quarry will progress in phases from the northern side across to the southern side. At the present time, it is intended that once a sufficiently wide haul road descending to the quarry floor has been put in place, backfilling of the quarry will be undertaken in defined blocks / areas, with a number of 'lifts' from the existing quarry floor to original ground level in each area.

2.50 The quarry void will be backfilled upwards from the existing quarry floor at approximately 37mOD to 39mOD, and a final floor level of 23mOD at the southern end of the quarry where an additional 15m deep bench will be extracted in the near future (1-2 years). Final formation levels on completion of the backfilling and restoration works vary on account of the sloped nature of the restored landform, from approximately 65mOD on the eastern side up to 85mOD on the western side (refer to cross-sections in Figure 2-4).

2.51 It is envisaged that the backfilling of the West Quarry will proceed as a single 'lift' from existing quarry floor level to surrounding ground level given the relatively limited depth of excavation (typically no more than 3m). It is also envisaged that backfilling will progress from south to north, from the back of the excavated area, toward the internal paved haul road which runs along its northern limit.

2.52 On final completion of the backfilling activities at each quarry, a cover layer of subsoil (approximately 350mm thick) and topsoil (approximately 150mm thick) will be placed and graded across the backfilled mineral soil as part of the final restoration works. This will then be rolled and planted with grass in order to promote stability and minimise soil erosion and dust generation. The planned restoration scheme also envisages that hedgerows will be planted across the restored areas in an effort to re-establish some of the former field boundaries which pre-dated quarry development.

Capacity and Lifespan

2.53 The estimated volume of inert soil and stone material to be placed at the North and West Quarries is approximately 5,025,000m^3. Of this, a relatively small volume, estimated at no more than 50,000m^3 will be sourced from on-site stockpiles, perimeter screening berms and general site levelling works required for the final restoration of the quarry. The remainder of the material will need to be imported.

2.54 The duration of backfilling activities at the North and West quarry voids will largely be dictated by the rate at which approximately 4,975,000m^3 (9,450,000 tonnes) of externally sourced inert soil and stone is imported to the site.

2.55 Although this planning application provides for an increase in the maximum permitted waste intake from 750,000 tonnes per annum to 1,500,000 tonnes per annum, it is not certain that the increased intake limit will be reached each year the facility continues in operation. There are many factors which will influence the soil waste intake rate, including, but not limited to the:

- Availability of acceptable inert materials from construction sites;
- Prevailing economic climate and related construction industry output;
- Distance of construction projects from the facility (and scale or duration of of activity);
- Logistical / programming constraints at sites generating inert materials;
- Climatic conditions (reduced construction activity in wet weather) and
- Disruptions along the existing local and national road network.

2.56 Were the maximum intake to be accepted at the facility each year, the time required to backfill both the North and West quarries would be of the order of 6 years.

2.57 If the average annual intake rate is lower, around the range of a more moderate 750,000 to 1,000,000 million tonnes per annum, the time required to achieve this would be of the order of 9.5 to 12 years.

Material Requirements

2.58 The only material requirements in respect of the planned restoration scheme at the Huntstown quarries are the inert soil, stone and rock to be used in backfilling them.

2.59 The total volume of backfilled soil required to create the restored landform at the North and West quarries is estimated to be approximately 5,025,000m^3. The backfilled materials will be subject to a degree of compactive effort in order maximise the overall capacity of the proposed recovery facility. An average target compaction density of 1.9t/m^3 assumed for tonnage assessment purposes, gives the overall requirement for approximately 9,550,000 tonnes of inert soil and/or subsoil.

2.60 No construction and demolition waste (intermixed concrete, brick, pipes, metal, timber etc.) is imported for backfilling purposes. At the present time, minor quantities of virgin aggregate is used as and when required to facilitate construction of temporary haul roads and movement of HGVs across previously backfilled areas.

2.61 Up to 50,000m^3 (95,000 tonnes) approximately of the materials required to backfill the quarry and/or reprofile the ground surface may be sourced from existing soil stockpiles and/or screening berms around the existing quarries.

2.62 All remaining inert materials to be used in the restoration of the application site will be imported from external construction work sites. Much of the inert soil and stone is expected to be sourced either from greenfield development sites or from deeper (basement) excavations into undisturbed and uncontaminated soils at previously developed sites.

2.63 An estimate of the material quantities required to complete backfilling of the application site is provided below: -

Table 2-1
Material Requirements

Material	Quantity (tonnes)	Source
Inert subsoil, stones and rock	9,400,000 tonnes	Imported
Stockpiled soil	95,000 tonnes	In-situ
Aggregate	20,000 tonnes	Imported
Topsoil (150mm)	30,000 tonnes	Imported

Waste Acceptance and Handling

2.64 Inert soil and stone waste is accepted at the Huntstown recovery facility between 07.00 hours and 18.00 hours each weekday and Saturday. No materials are accepted at any other time including Sundays and Public Holidays.

2.65 Insofar as practicable, the source of each large consignment of soil and stone imported to the facility for backfilling and recovery purposes is identified in advance and subject to basic characterisation testing to confirm that soils at that location can be classified as inert. Ideally, characterisation testing will be undertaken in advance by customers / clients / contractors intending to forward soil to the facility.

2.66 Operating procedures at the recovery facility require all soil and stones forwarded for backfilling / recovery purposes to be pre-sorted at source, inert and free of construction or demolition waste or any non-hazardous / hazardous domestic, commercial or industrial wastes.

2.67 CCTV cameras mounted around the weighbridge and weighbridge office and are used to inspect all consignments being imported to the recovery facility. Any waste materials that are deemed to be unacceptable for recovery at the facility on the basis of a visual inspection at the weighbridge are rejected and directed to an alternative authorised waste facility.

2.68 All inert soils imported to the site are unloaded (end-tipped) from HGVs / trucks at the active backfilling area. Waste consignments are visually inspected by site personnel at that point to confirm that there is no intermixed construction or demolition, non-hazardous or hazardous waste placed within it.

2.69 If, following acceptance of waste, there is any subsequent grounds for concern about the nature of the wastes imported to site, it is segregated and transferred to the waste inspection and quarantine area for closer inspection and classification. A detailed record will be kept of all such inspections.

2.70 A representative sample is taken from one in every 120 loads of inert soil and stone accepted at the facility and subjected to compliance testing by Roadstone, as required by the existing waste licence. These data are used to confirm that the accepted soils are inert and comply with acceptance criteria.

2.71 Laboratory testing of imported soil, surface water, groundwater and soil water percolate (leachate) is undertaken off-site at an ILAB / UKAS accredited geo-environmental laboratory. All compliance / validation testing and laboratory testing required to confirm the inert classification of imported soil and stone waste soil is undertaken by an accredited laboratory.

2.72 A copy of the current Waste Handling and Acceptance Plan for this facility is provided in Appendix 2-1 of this Environmental Impact Statement.

Removal of Materials Off-Site

2.73 Any non-hazardous or hazardous wastes identified within the inert soil and stone imported for recovery is separated and transferred to the waste inspection and quarantine facility, pending subsequent removal off-site to authorised waste disposal or recovery facilities by permitted waste collectors. On the basis of experience gained to date in operating this and other waste recovery facilities in the Greater Dublin Area however, Roadstone anticipates that the quantities of such wastes requiring removal off-site are likely to very low.

2.74 Small volumes of virgin aggregate are used for construction of temporary haul roads at the recovery facility. Any concrete, brick, timber, metal, pipes, skips, tiles or other construction and demolition / quarry waste currently held at the quarries will be removed off-site to an authorised waste recovery or disposal facility prior to placement of imported soil and stone. Any existing scrub vegetation will also be removed and recycled.

2.75 Any construction and demolition waste inadvertently brought to site in the course of the recovery operations is separated using mechanical plant and stockpiled at the waste quarantine area pending transfer off-site to an authorised construction and demolition waste recovery facility.

2.76 Any occasional metal waste encountered on site is separated and placed in a skip pending removal off site to a permitted (or licensed) waste recovery facility. Other non-inert waste (timber, plastic etc.) is also be separated and placed in a skip pending removal to an authorised waste facility.

2.77 Only operators and/or haulage firms holding valid current waste collection permits will be engaged to transfer these waste streams to other waste disposal or recovery facilities.

Stability and Drainage of Backfilled Materials

2.78 Visual inspection and available site investigation data indicates that the areas to be backfilled are underlain by slightly weathered to fresh intact, competent bedrock. Backfilling of the quarry using in-situ and imported soil and stone will not therefore induce failure within the underlying ground. The application of loading to the underlying rock will not exceed that which existed prior to extraction and, as such, no deep seated foundation failure is anticipated.

2.79 Temporary side slopes in backfilled soils are graded at angles no steeper than 35° (approximately 1v:1.5h) and often considerably shallower, thereby ensuring that no large scale instability arises in imported backfill soil over the short-term. Temporary access ramps into and out of active backfilling areas are / will be constructed at a gradient of approximately 1v:10h. Ongoing inspection and assessment of stability will be undertaken at the facility as backfilling progesses.

2.80 During site restoration works, the upper surface of the backfilled materials is graded so as to ensure any surface water run-off falls to sumps at temporary low points within the quarries. As previously noted, water is pumped from these temporary sumps to existing channels and settlement ponds at original ground surface level on the eastern side of the North Quarry as required, and from there is discharged via settlement and treatment infrastructure to a tributary stream of the Ward River.

2.81 In the longer-term, once backfilling and restoration works are complete, there will be no risk of instability as the restored ground surfaces will be relatively flat or graded to form very shallow slopes. Permanent restored slopes on completion of the site backfilling and restoration activities will be everywhere less than 1v:2h (26°) and over much of the restored areas, considerably shallower than this, typically 1v:8h (7°).

2.82 Given that the bulk of the soil materials to be imported to site for restoration purposes are likely to be relatively competent glacial tills, no long-term slope instability is anticipated to occur. This assertion is made in view of the fact that glacial till slopes of 1v:2h are routinely constructed for infrastructure projects across Ireland and are demonstrably stable.

EXISTING ENVIRONMENTAL CONTROLS

General

2.83 Backfilling and restoration activities at Huntstown require a number of environmental controls to eliminate or minimise the potential nuisance to the public arising from the importation, placement and compaction of inert soil and stones. The environmental control measures outlined in the following sections are already in place and will continue in operation when waste intake increases and recovery activity intensifies.

2.84 The quarry backfilling and restoration works are ultimately regulated by the conditions attaching to the existing waste recovery licence (Ref. W0277-01) issued by the Environmental Protection Agency (EPA). Any additional control measures, over and above those already in place and/or outlined below, which may be instructed on foot of the proposed waste licence review application to provide for the increased waste intake will also be implemented.

Bird Control

2.85 As the soil and stones being placed / recovered at the Huntstown facility are free of putrescible (food / kitchen) waste, the on-site activities do not attract scavenging birds such as gulls and crows. Accordingly, there is no requirement to implement any specific bird control measures at the facility.

2.86 In the unlikely event that any putrescible waste is identified among imported materials, it will be immediately removed to the waste quarantine area pending removal off-site to an authorised waste disposal or recovery facility.

Dust Control

2.87 In dry, windy weather conditions, the backfilling and restoration activities at the Huntstown quarries may give rise to dust blows across and beyond the quarries and waste recovery facility. In order to control dust emissions, the following measures are / will be implemented:-

- water is sprayed from a tractor drawn bowser on dry exposed surfaces (paved roads, unsealed haul roads and hardstand areas)
- dust blows are partially screened by the quarry side walls as backfilling progresses upwards (this is more relevant and significant at the North Quarry). As the level of the backfilled materials approach the final (original) surface levels, they will be topsoiled and seeded with grass on a phased basis. This will help to minimise soil erosion and potential dust emissions;

- the area of bare or exposed soils will, insofar as practicable, be kept to a minimum. If necessary, consideration will be given to establishing temporary vegetation cover over temporary exposed soil surfaces and/or stockpiles pending backfilling and restoration to final ground levels;
- all HGV's exiting the recovery facility are routed through the existing wheelwash facility along the egress route to the R135 North Road (refer to traffic routing plan in Figure 2-5). This minimises the transport of fines by HGVs over the access / egress road and the public road network;
- stockpiling of imported soil materials will be minimized. Soils will ideally be placed and compacted in-situ immediately after being imported to site and end tipped. If and when temporary stockpiling of soil is required, it will be placed as far as practicable from nearby residences.

2.88 The amount of dust or fines carried onto the public road network is further reduced by periodic sweeping of internal paved site roads and surrounding public roads as required. It is possible that the increases in soil and stone waste intake may necessitate increased road cleaning effort when potentially adverse (dry, windy) weather conditions arise.

Traffic Control

2.89 Waste recovery activities at Huntstown North and West quarries will require the importation of 9,450,000 tonnes of inert soil and stone waste in order to backfill the quarry voids to their original ground level. This is equivalent to approximately 472,500 HGV return trips (at 20 tonnes per load) in order to completely backfill the quarry voids.

2.90 Based on recent experience of demand for soil and stone waste recovery capacity (refer to Chapter 1), Roadstone has defined a relatively optimistic scenario where it would be possible to fill the voids at the North and West Quarries in approximately 6 years from 2017 with an annual permitted waste intake of up to a maximum of 1,500,000 tonnes per annum. Although it is likely that it could take longer to fill the quarry voids as a result of future fall back in construction related activity, the 6 year scenario will form the basis for modelling and assessment of traffic impacts.

2.91 Assuming a maximum annual intake of up to 1,500,000 tonnes / year is approved, this would correspond to an average of 24 trips per working hour over a 11 hour working day (equivalent to 48 movements per hour), in and out of the Huntstown facility (an increase of 12 trips (or 24 movements) per hour over and above the current permitted maximum).

2.92 As indicated in Chapter 13 of this Environmental Impact Statement, intensification of operations at the waste recovery facility will have no adverse impact on traffic flows along the existing North Road (the former N2 National Primary Road).

2.93 Based on its experience of comparable high levels of demand over the early months of 2016, Roadstone has contingency measures in place to ensure safe and orderly queuing of HGV traffic along the existing network of internal paved roads, should it be required if periods of intense or elevated demand occur. Any roadside vegetation which could potentially impact on visibility splays will continue to be cut back as required in order to maintain visibility for HGV traffic exiting onto the R135 North Road.

Litter Control

2.94 As the materials being placed at the Huntstown recovery facility are largely free of litter, the backfilling and restoration activities are unlikely to give rise to problems with windblown litter. Accordingly, there is no requirement to implement any specific litter control measures at the facility.

2.95 In the unlikely event that any litter waste is identified among the imported waste materials, it will be immediately removed to the waste quarantine area pending removal off-site to an authorised waste disposal or recovery facility.

Odour Control

2.96 Any vegetation or organic materials which are present around the floor and sides of each quarry has been / will be uprooted and/or cut back, chipped, removed and recycled off-site prior to commencement of backfilling activities.

2.97 The soil and stone waste being imported and recovered is inert, inorganic and free of biodegradeable material and/or organic contamination. It will not therefore break down and emit odourous gases over time.

2.98 In the absence of any organic waste, the recovery activities at the Hunstown facility are highly unlikely to not give rise to odour nuisance and therefore no requirement to implement any specific odour control measures at the facility.

2.99 In the unlikely event that any organic and/or biodegradeable waste is identified or suspected among imported soil and stones wastes, it will be immediately removed to the waste quarantine area pending removal off-site to an authorised waste disposal or recovery facility.

Vermin Control

2.100 As the soils and stones being placed / recovered at the Huntstown recovery facility are free of putrescible (food / kitchen) waste, on-site activities will not attract vermin (rats) for the duration of the backfilling operations. Accordingly, no specific vermin control measures are implemented at the facility.

2.101 In the unlikely event that any putrescible waste is identified among imported materials, it shall be immediately transferred to the waste quarantine area pending removal off-site to a licenced waste disposal or recovery facility.

Fire Control

2.102 As the soil and stones being placed / recovered at the Huntstown facility are free of flammable materials and biodegradable waste which could create a fire or explosion risk, on-site soil and stone waste recovery activities will not present a fire risk for the duration of the backfilling operations. Accordingly, there is no requirement to implement specific fire control measures at the facility.

2.103 Notwithstanding this, the following operational practices will be implemented in order to prevent fire at the application site:

- smoking at the application site, at the recovery facility / weighbridge office and canteen is prohibited
- any biodegradable or flammable waste included in materials imported to site is immediately transferred to the waste quarantine area pending removal off-site to an authorised waste disposal or recovery facility
- plant and equipment is removed if they exhibit signs of overheating etc.

2.104 In the unlikely event that a fire does occur, the local fire stations in Finglas and Swords will be contacted and emergency response procedures will be implemented. Fire extinguishers (water and foam) are provided at all offices to deal with any small outbreaks which may occur.

EXISTING ENVIRONMENTAL MONITORING

General

2.105 There is an established programme of environmental monitoring in connection with ongoing rock extraction, aggregate processing, concrete production and waste recovery activities across the Huntstown Complex. This environmental monitoring programme complies with the requirements of existing planning permissions, waste permits and effluent discharge licences in respect of these activities granted by Fingal County Council. The existing monitoring programme also complies with the requirements of the existing waste licence issued by the EPA (Ref. W0277-01).

2.106 Roadstone operates an environmental management programme to monitor and manage emissions from its established on-site operations. Limit values for environmental emissions arising from these activities are identified by the EPA waste licence and other consents (as appropriate).

2.107 Environmental sampling, monitoring and testing is generally undertaken by Roadstone in-house personnel, with support from independent external consultants as and when required. Records of environmental monitoring and testing are held on-site and forwarded to the EPA and/or Local Authority as required under the terms of the waste licence and various consents.

Dust Monitoring

2.108 Dust emissions associated with established site activities concrete production activities within Roadstone landholding at Huntstown are monitored on a monthly basis using Bergerhoff dust gauges at 6 No. locations (designated D1 to D6) shown on Figure 2-7. These gauges are located close to emission sources or potentially sensitive receptors located beyond Roadstone's property boundary.

2.109 It is currently envisaged that the existing dust monitoring stations will remain in place and that one additional dedicated monitoring station will be established prior to commencement of waste recovery activities in the West Quarry (subject to EPA review). These monitoring stations will be monitored for the duration of the quarry backfilling and restoration activities and will also continue for a short duration thereafter, as required by the facility closure and aftercare plan.

Ecological Monitoring

2.110 Given the history of extractive industry at the North Quarry and West Quarry and the absence of any rare or protected species, it is envisaged that there will be no requirement for ecological monitoring or reporting during the backfilling and restoration / soil waste recovery operations at each location.

Groundwater Monitoring

2.111 At the present time, there are 6 No. groundwater monitoring wells installed around the Huntstown Quarry Complex. Of these 3 No. are located in close

proximity to the North and West Quarries (GW3, GW4 and GW5), while 3 No others are located to the south and east, at the locations shown in Figure 2-7.

2.112 At the present time, groundwater sampling is undertaken on a quarterly basis. Testing of physical parameters is undertaken on collected samples on a quarterly basis, while testing of chemical parameters is undertaken on either a bi-annual or annual basis (depending on the parameter).

2.113 The principle objective of groundwater testing is to assess ground water quality and to confirm that the on-site waste recovery activities are having no detrimental impact on groundwater quality. The groundwater monitoring wells will be monitored for the duration of the quarry backfilling and restoration activities and will also continue for a short duration thereafter, as required by the facility closure and aftercare plan.

2.114 Groundwater levels are also recorded on a quarterly basis. Further detail on groundwater quality and testing is presented in Section 6 of this Environmental Impact Statement.

Meteorological Monitoring

2.115 No meteorological monitoring is undertaken at the existing waste recovery facility. However, given that it is located 6km west of Dublin Airport, it is considered reasonable to refer to temperature, rainfall, sunshine, wind speed and direction records obtained at the weather station at Dublin Airport, as and if required.

Noise Monitoring

2.116 Noise emissions associated with ongoing rock extraction, aggregate processing, concrete production and waste recovery activities within Roadstone's landholding at Huntstown are monitored on a quarterly (ie. three monthly) basis at 5 No. locations (designated N1 to N5) of which 4 No. are close to the Roadstone property boundary and 1 No. is at the central infrastructure area.

2.117 Noise monitoring is undertaken using a Larson Davis Model 824 Sound Level Meter, calibrated using a Larson Davies Acoustic Calibrator CAL 200 (or equivalent). Noise monitoring locations are indicated in Figure 2-7.

Odour Monitoring

2.118 As the materials being placed or recovered at this site are not organic or biodegradeable and do not therefore emit odourous gases, the on-site backfilling and restoration / waste recovery activities do not give rise to odour nuisance. Accordingly, no provision has been made for odour monitoring at this facility.

2.119 Site staff will report, record and investigate any odour emissions in the highly unlikely event that a complaint is ever made about odours emanating from the recovery facility.

Surface Water Monitoring

2.120 As required by the existing waste licence, surface water sampling at the existing recovery facility is currently undertaken on a weekly basis at monitoring location W4, immediately downstream of the dedicated settlement pond which treats only waters emanating from waste recovery activities at the North Quarry. Testing of key chemical parameters is undertaken on collected samples on a

weekly basis, while testing of other chemical parameters is undertaken on either a bi-annual or annual basis (depending on the parameter). Further detail on surface water quality and testing is presented in Section 6 of this Environmental Impact Statement.

2.121 Occasional sampling and testing is / will also be undertaken on samples taken from any temporary surface water features which may either be created or form naturally at low points within the North and West quarries as they are being backfilled.

2.122 As required by the existing effluent discharge licence, surface water sampling and testing is also undertaken at monitoring location W1, immediately downstream and east of the settlement lagoons which serve the central infrastructure area and upstream of the off-site discharge to the Ballystrahan Stream, a tributary stream of the Ward River. These and other established surface water monitoring locations at the Huntstown facility are shown on Figure 2-7.

2.123 The principle objective of surface water monitoring is to assess water quality and to confirm there is no contamination associated with waste recovery activities on-site. Surface waters will be monitored for the duration of the quarry backfilling and restoration activities and will also continue for a short duration thereafter, as may be required by the facility closure and aftercare plan.

PLANNED FINAL RESTORATION AND AFTERCARE

2.124 The principal recovery activity undertaken at the Huntstown quarries is the importation of inert soil and stone waste to fill existing quarry voids back to their original ground level and to restore the lands to agricultural use, most likely as grassland, refer to the overall site restoration plan for the Huntstown quarry complex provided in Figure 2-2.

2.125 Topsoil will be imported to the North Quarry and West Quarry for recovery on a continual basis. It will not be used immediately in general backfilling of the quarry voids, rather it will be stockpiled separately pending re-use toward the latter stages of the works, when the top surface of the backfilled ground approaches the planned final ground level envisaged by the restoration scheme. The topsoil shall be stored separately within each quarry, away from the active backfilling area and in such location and manner as not to create any temporary adverse visual impact or dust nuisance.

2.126 On completion of the backfilling activities at each quarry, a cover layer comprising 150mm of topsoil and approximately 300mm of subsoil will be placed over the inert backfilled materials This will be initially seeded with a native grass mix in order to promote stability and minimise soil erosion and dust generation.

2.127 The overall restoration scheme also envisages that hedgerows will be planted across the restored lands in an effort to re-establish field boundaries similar to those which pre-dated the development of each quarry.

2.128 On completion, the final landform(s) will be modified as necessary to ensure that any surface water run-off across the infilled quarries will be intercepted and/or channelled eastwards toward the existing (natural / modified) surface water drainage network and the tributary stream of the Ward River which runs northward out of the Roadstone landholding.

2.129 On completion, all mobile plant and equipment associated with the waste recovery activities will be removed off-site. Any dedicated site accommodation, infrastructure and/or services will also be progressively decommissioned and/or removed off-site. Any elements of shared infrastructure used by adjacent aggregate processing or concrete production activities (including settlement ponds) will remain in place.

2.130 Wherever necessary, sealed concrete / paved surfaces will be broken up using a hydraulic breaker and transferred-off site to a local authorised construction and demolition waste recovery facility.

2.131 Following final completion of the restoration and site decommissioning works, provision will be made for further, short-term (<1year) environmental monitoring of air, surface water and groundwater.

DESCRIPTION OF WASTE RECOVERY FACILITY 2

FIGURES

SITE ACCESS (NOT IN USE)

SETTLEMENT PONDS

WASTE INSPECTION SHED

WEIGHBRIDGE

WEIGHBRIDGE OFFICE

SECURITY HUT

WEIGHBRIDGE LABORATORY

WEIGHBRIDGE OFFICE

BUNDED FUEL STORAGE

MACHINE MAINTENANCE BUILDING

SECURITY HUT

BUNDED FUEL STORAGE

BLOCK YARD

VIRIDIAN POWER STATION
(EXCLUDED - NOT OWNED BY ROADSTONE LIMITED)

SECURITY HUT

WHEELWASH

N

0 50 100 150 200m 300 400 500

Metres 1:5000

NOTES

1. EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET **NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B.**

2. ORDNANCE SURVEY IRELAND LICENCE NO. **SU 0000716 (C)** ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- ROADSTONE LIMITED LAND INTEREST **(c. 200.3 ha)**
- APPLICATION AREA **(c. 48.65 ha)**
- N2 DUAL CARRIAGEWAY
- NORTH ROAD (R135)
- LOCAL ROAD
- SEMI-PERMANENT / EPHEMERAL PONDS IN WEST QUARRY (JUNE 2016)

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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT

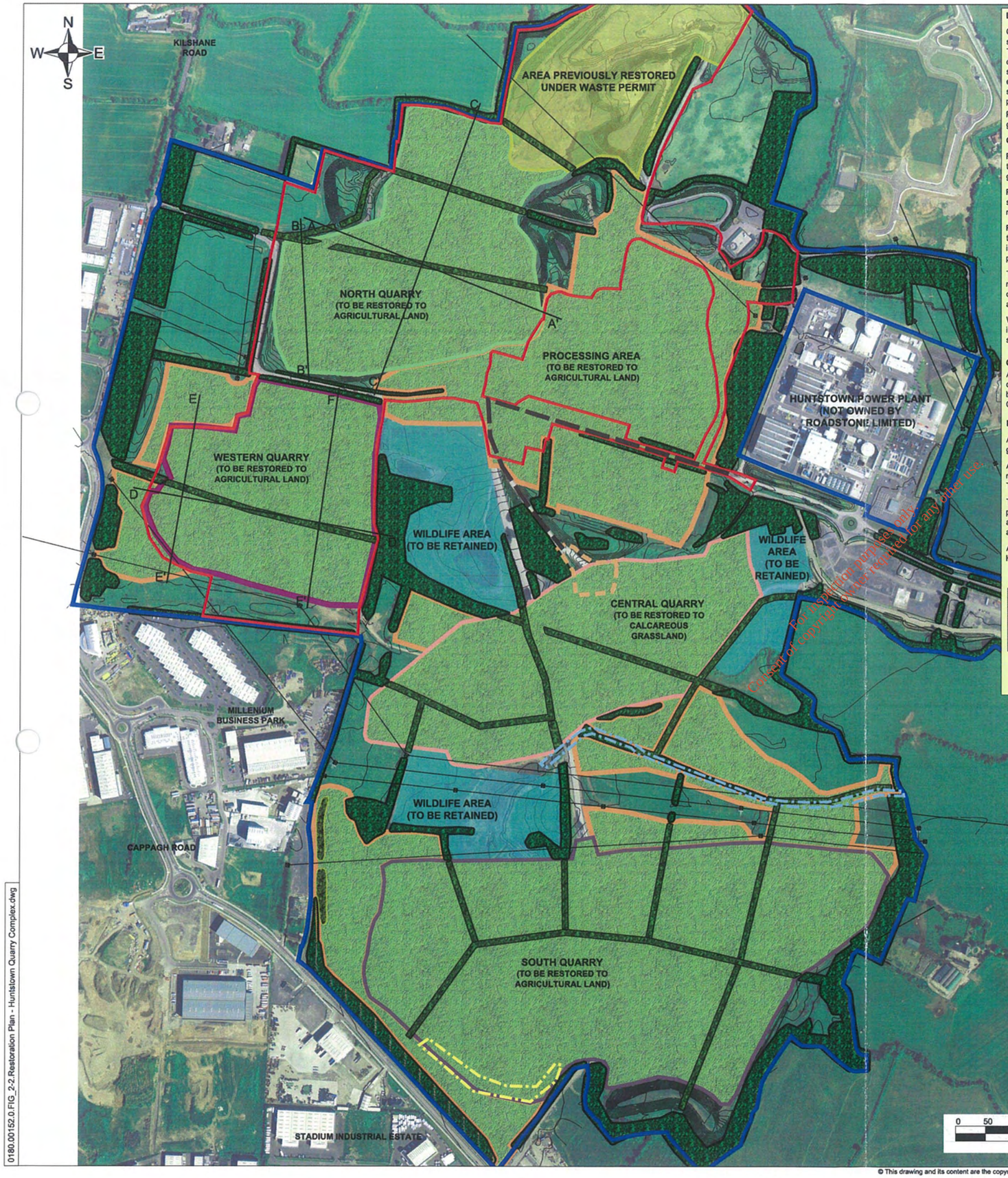
HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

EXISTING WASTE RECOVERY FACILITY LAYOUT

FIGURE 2-1

Scale	Date
1:5,000 @ A3	AUGUST 2016

0180.00152.0.FIG_2-1.Existing Site Layout Map.dwg



LANDSCAPE AND RESTORATION SCHEME

On completion of the extraction works, it is proposed to fill the quarry voids using imported inert soils and overburden and topsoil stored on site. The western quarry will be restored without further quarrying, as the stone material was found to be of inferior quality. The quarry areas will then be returned to agricultural after-use, with the exception of the Central Quarry which will be restored to calcareous grassland, to increase the biodiversity of the site and connect the existing wildlife areas. The final restored levels will be similar to the previous levels, prior to any extraction works taking place. Restoration will take place in a phased manner, as extraction operations cease in a given area and are subject to waste licenses being granted. In order to divide the large sites into smaller compartments, it is proposed to carry out native hedge planting in the location of former boundary lines, as indicated on the plan.

Please note that Roadstone Ltd are committed to pump all of the worked out quarry voids until such time that waste licenses are granted and the voids are filled to above the ground water level, in order to avoid large water bodies forming.

CULTIVATION, GRASS SEEDING AND ESTABLISHMENT (AGRICULTURAL GRASSLAND)

Following cessation of landform construction, topsoil and soil forming materials, from storage mounds on site, are to be spread over the areas to be restored to grassland to a depth of 20mm. All soil handling to be carried out in accordance with current best pactice guidance.

Final cultivations will include raking the seeding area with a chain harrow or drag mat to form a true, even surface, suitable for subsequent maintenance by mechanical blade trimming and extending the cultivation into any adjacent existing areas to ensure full marrying in of levels and to achieve a fine tilth.

For all areas, an agricultural seed mix suitable for the intended land use will be evenly sown, in calm weather, at an appropriate time of year (for example September) at the rate recommended by the manufacturer. The seed to be used is to be fresh and for use in the season of seeding. A certificate is to be provided in respect of each consignment of seed mix giving the supplier's name, the proportions of constituents of the mixture and a signature of the representative of the supplier.

The contractor shall mix the seed well with bulking agent, e.g. dry sand, in order to assist an even distribution. The seed will be mixed well before application and frequently during application. The seed will be divided into two equal sowings in two transverse directions at the specified rates. After seeding, the soil will be lightly harrowed or surface rakeed and rolled lightly, for example with a Cambridge roller, to ensure a good contact between soil and seed.

When the grass is between 40mm and 75mm high, the contractor will remove debris and all stones and clay balls larger than 40mm in any dimensions and roll the area with a light roller. The area will be cut to approximately 35mm high. Spot treatment using a selective herbicide shall be applied to pernicious agricultural weeds, such as thistle, docks and ragworth.

CALCAREOUS GRASSLAND

As far as practically possible, the in-filled Central Quarry will be restored to fields supporting calcareous grassland. As the landform construction is nearing completion, guidance will be sought from an experienced ecological consultant. It is envisaged that it should be possible to collect seed and/or take hay cuts for seeding from the existing fields along the eastern boundary of the Central Quarry. In any case no fertiliser will be applied to this area, to ensure the best chance of developing a species rich sward.

PROPOSED NATIVE WOODLAND SCREEN AND HEDGE PLANTING

Approximately 3,000 sq.m. of woodland screen planting is to be carried out and it to be planted at 1.5m centres, in same species groups of 20-30. Groups are to be randomly spread throughout the planting blocks.

Approximately 4,800 lin.m. of hedge will be planted in total. Hedges are to be planted in two staggered rows, with plants within each row 50cm apart (i.e. 4 plants per m) and rows 50cm apart. Feathered trees to be planted at distances of 8-16m and staked. Transplants to be planted randomly in same species groups of 10-20.

Trees shall conform to BS3936 for nursery stock and shall be supplied true to size and species name, as per the tables below. All proposed plant species are native and will be sourced locally. The percentage of berry producing trees is low, in order not to attract a large amount of birds, which could result in a hazard for Dublin Airport. Planting is to take place between the months of November and March.

All plant handling, planting works and aftercare will be carried out in accordance with the CPSE Recommendations for Plant Handling. Establishment maintenance to be carried out for 24 months following the completion of each planting phase.

Native Woodland Screen Planting Mix

No.	Plant Name	Common Name	Height (cm)	Age/Pot Size	%
Transplants					
390	Alnus glutinosa	Common Alder	60-90	1+1	30
260	Corylus avellana	Hazel	60-90	1+0	20
390	Euonymus europaeus	Spindle Tree	60-90	1+1	30
130	Quercus robur	Pedunculate Oak	60-90	1+1	10
130	Salix caprea	Goat Willow	60-120	0+1	10

Native Hedge Planting Mix

No.	Plant Name	Common Name	Height (cm)	Age/Pot Size	%
Feathered Trees					
190	Alnus glutinosa	Common Alder	150-175	2xTR	1
190	Quercus robur	Pedunculate Oak	150-175	2xTR	1
Transplants					
3450	Alnus glutinosa	Common Alder	60-90	1+1	18
4800	Corylus avellana	Hazel	60-90	1+0	25
2880	Crataegus monogyna	Hawthorn	60-90	1+1	15
4800	Euonymus europaeus	Spindle Tree	60-90	1+1	25
1920	Prunus spinosa	Blackthorn	60-90	1+0	10
960	Sorbus aucuparia	Rowan	60-90	1+1	5

NOTES

1. TOPOGRAPHIC SURVEY PREPARED BY FUGRO BKS BASED ON MAY 2009 AERIAL PHOTOGRAPHY
2. ALSO REFER TO FIGURES 2-3 & 2-4: RESTORATION SECTIONS (NORTHERN AND WESTERN QUARRY)

LEGEND

- ROADSTONE LIMITED LAND INTEREST (c. 200.3 ha)
- APPLICATION AREA (c.48.65 ha)

EXISTING FEATURES TO BE RETAINED

- HEDGEROWS AND SCREEN PLANTING BELTS
- WILDLIFE AREAS
- AREA PREVIOUSLY RESTORED UNDER EXISTING WASTE LICENCE PERMIT
- STREAM CORRIDOR FROM WILDLIFE AREA TO EASTERN BOUNDARY OF SITE
- ELECTRICITY LINES CROSSING OVER THE APPLICATION SITE

PROPOSED LANDSCAPE FEATURES

- PROPOSED WOODLAND SCREEN PLANTING ALONG PARTS OF WESTERN BOUNDARY

PROPOSED RESTORATION FEATURES

- PROPOSED RESTORATION CONTOURS
- QUARRY AREA TO BE INFILLED AND RESTORED TO AGRICULTURAL LAND UNDER EXISTING WASTE LICENCE (REF: W0277-01): INCREASED FILL RATE SUBJECT TO THIS APPLICATION
- PREVIOUSLY STRIPPED WESTERN QUARRY AREA TO BE INFILLED AND RESTORED TO AGRICULTURAL LAND, SUBJECT TO THIS APPLICATION
- QUARRY AREAS TO BE INFILLED AND RESTORED TO AGRICULTURAL LAND SUBJECT TO FUTURE WASTE LICENCE APPLICATIONS
- PROCESSING AREA, DISTURBED GROUND & OVERBURDEN AREAS TO BE LEVELLED AND RESTORED TO AGRICULTURAL LAND
- QUARRY AREA TO BE INFILLED AND RESTORED TO CALCAREOUS GRASSLAND SUBJECT TO FUTURE WASTE LICENCE APPLICATIONS
- PROPOSED HEDGEROWS IN THE APPROXIMATE LOCATIONS OF FORMER BOUNDARY LINES
- RETAINED QUARRY FACE FOR EXISTING PERIGRINE FALCONS ON SITE
- RETAINED QUARRY FACE FOR FUTURE ACCESS TO VIEW TOBER COLLEEN FORMATION OVERLAYING WAULSORTIAN LIMESTONE
- RETAINED INTERNAL ACCESS ROAD TO VIEW QUARRY FACE

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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT

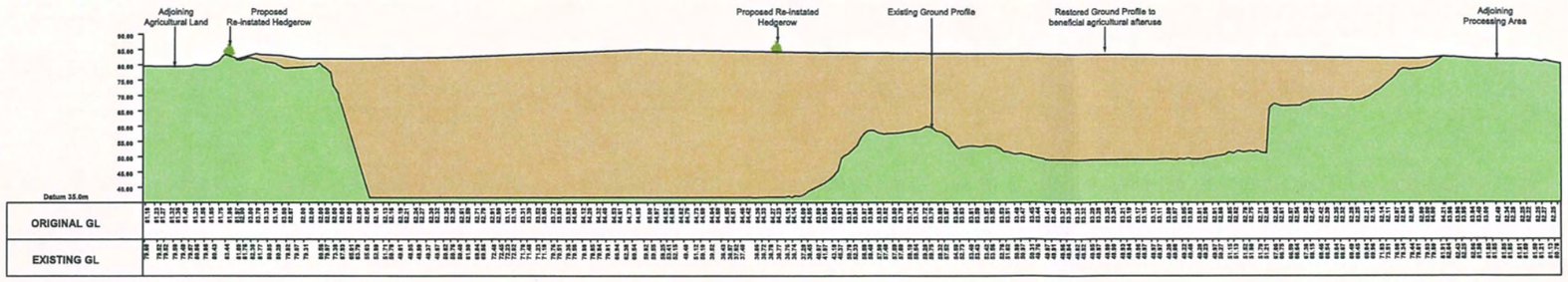
HUNTSTOWN WASTE RACOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

RESTORATION PLAN
HUNTSTOWN QUARRY COMPLEX

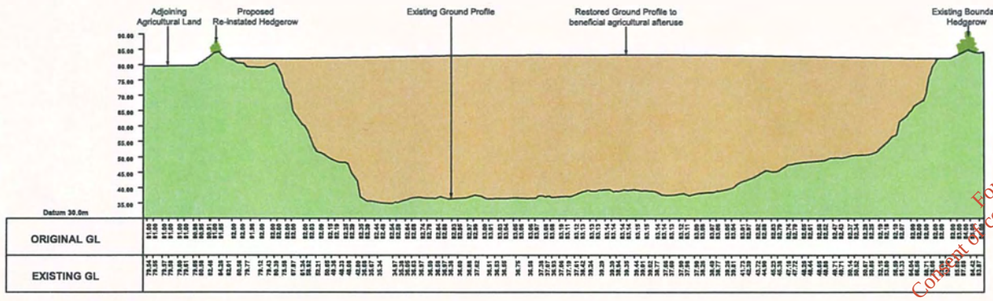
FIGURE 2-2

Scale	Date
1:5,000 @ A2	AUGUST 2016

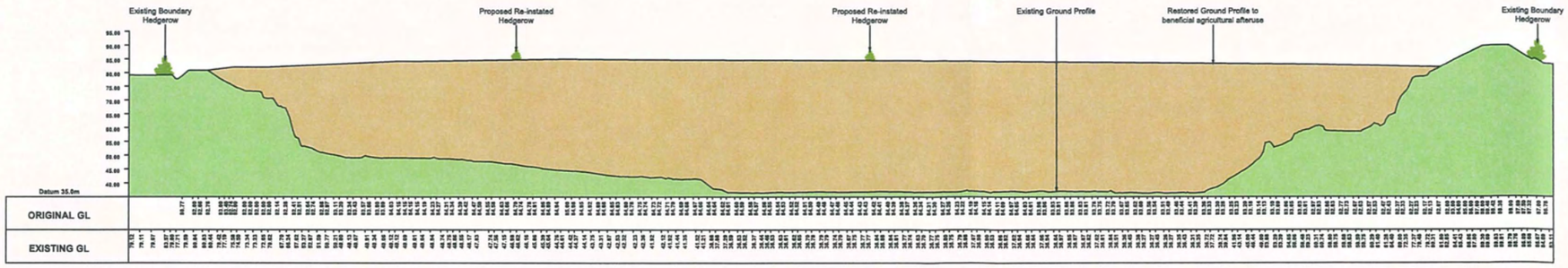
0180.001520.FIG_2-2.Restoration Plan - Huntstown Quarry Complex.dwg



NORTH QUARRY - Section A - A'



NORTH QUARRY - Section B - B'



NORTH QUARRY - Section C - C'

0 20 40 60 80m 120 160 200

Metres 1:2000

NOTES

1. REFER TO **FIGURE 2-2** FOR LOCATIONS OF CROSS SECTIONS

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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT

HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

NORTH QUARRY
RESTORATION CROSS SECTIONS

FIGURE 2-3

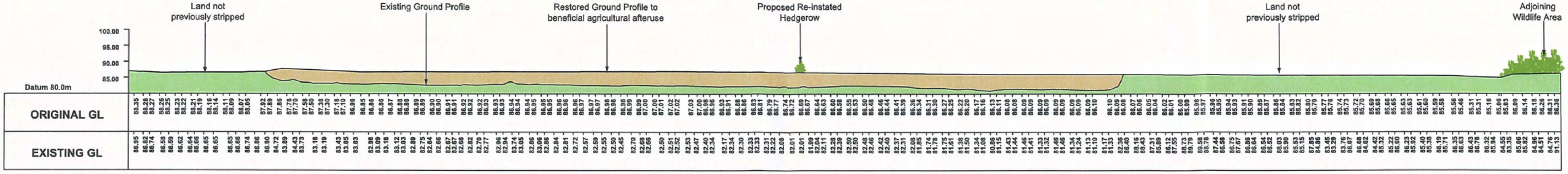
Scale: 1:2,000 @ A3

Date: AUGUST 2016

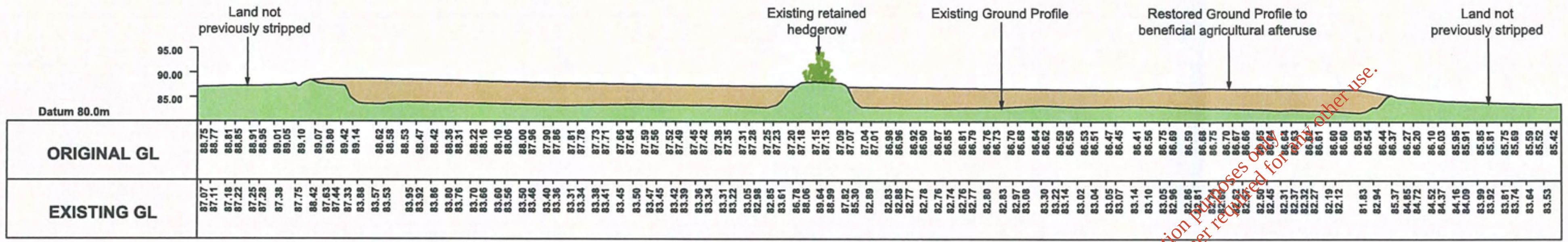
0180.00152.0.FIG_2-3.North Quarry - Restoration Cross Sections.dwg

NOTES

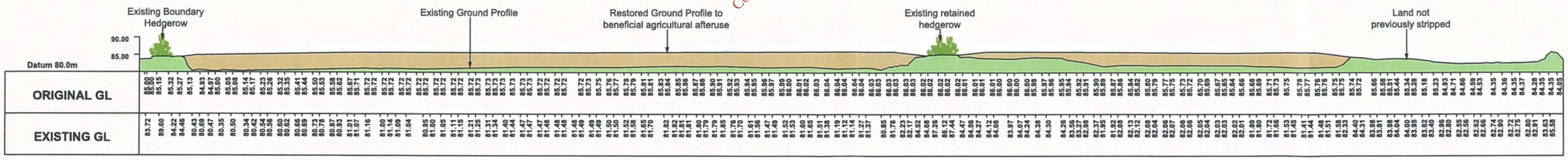
1. REFER TO **FIGURE 2-2** FOR LOCATIONS OF CROSS SECTIONS



WEST QUARRY - Section D - D'



WEST QUARRY - Section E - E'



WEST QUARRY - Section F - F'

0180.00152.0.FIG_2-3.North Quarry - Restoration Cross Sections.dwg

0 20 40 60 80m 120 160 200

Metres 1:2000

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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT

HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

WEST QUARRY
RESTORATION CROSS SECTIONS

FIGURE 2-4

Scale	Date
1:2,000 @ A3	AUGUST 2016

NOTES

1. EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B.

2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000716 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- ROADSTONE LIMITED LAND INTEREST (c. 200.3 ha)
- APPLICATION AREA (c. 48.65 ha)
- NORTH ROAD (R135)
- LOCAL ROAD
- HGV DIRECTION
- HGV DIRECTION
- SEMI-PERMANENT / EPHEMERAL PONDS IN WEST QUARRY (JUNE 2016)

N

WEIGHBRIDGE
WEIGHBRIDGE OFFICE
SECURITY HUT
WHEELWASH
SITE ACCESS FROM NORTH ROAD (R135)

0 50 100 150 200m 300 400 500
Metres 1:5000

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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT

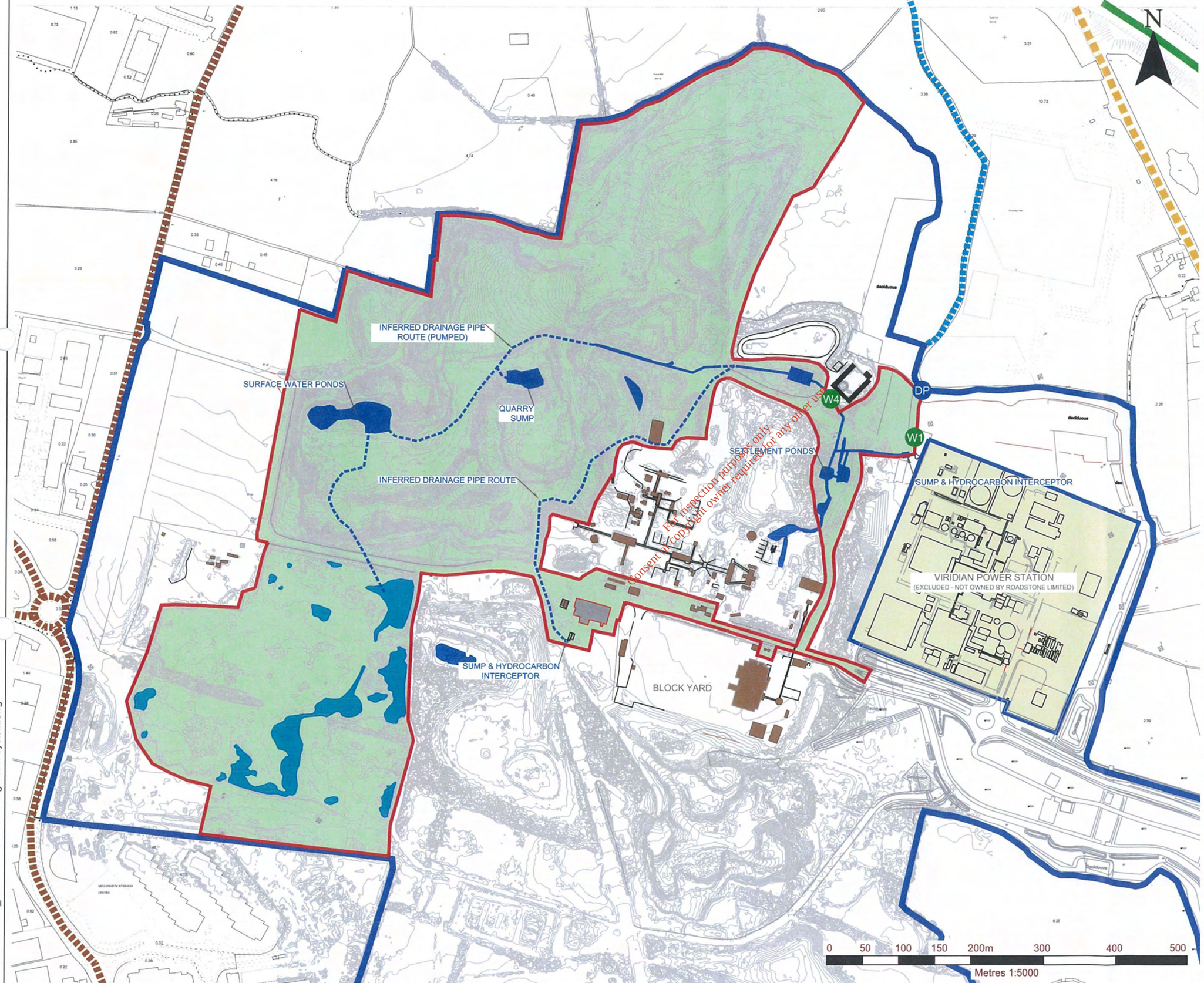
HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

INTERNAL TRAFFIC ROUTING AROUND WASTE RECOVERY FACILITY

FIGURE 2-5

Scale	Date
1:5,000 @ A3	AUGUST 2016

0180.00152.0.FIG_2-5.Internal Traffic Routing around Waste Recovery Facility



NOTES

1. EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET **NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B.**

2. ORDNANCE SURVEY IRELAND LICENCE NO. **SU 0000716 (C)** ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- ROADSTONE LIMITED LAND INTEREST **(c. 200.3 ha)**
- APPLICATION AREA **(c. 48.65 ha)**
- N2 DUAL CARRIAGEWAY
- NORTH ROAD (R135)
- LOCAL ROAD
- BALLYSTRAHAN STREAM
- W1 SURFACE WATER MONITORING LOCATIONS
- DP DISCHARGE POINT
- EPHEMERAL PONDS IN WEST QUARRY

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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT

HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

SURFACE WATER MANAGEMENT SYSTEM

FIGURE 2-6

Scale	Date
1:5,000 @ A3	AUGUST 2016

0180.00152.0.FIG_2-6.Surface Water Management System.dwg

Plotted: 10 Oct 2016 02:32:31

N

NOTES

1. EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B.

2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000716 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- ROADSTONE LIMITED LAND INTEREST (c. 200.3 ha)
- APPLICATION AREA (c. 48.65 ha)
- N2 DUAL CARRIAGEWAY
- NORTH ROAD (R135)
- LOCAL ROAD
- M50 MOTORWAY
- N1 NOISE MONITORING LOCATION
- D5 DUST MONITORING LOCATION
- GW02 GROUNDWATER MONITORING WELL LOCATION
- W4 SURFACE WATER MONITORING LOCATION
- B1 BLAST MONITORING LOCATION

0 100 200 300 400m 600 800 1000
Metres 1:10,000

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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT

HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

ENVIRONMENTAL MONITORING LOCATIONS

FIGURE 2-7

Scale: 1:10,000 @ A3
Date: AUGUST 2016

0180.00152.0.FIG_2-7.Environmental Monitoring Locations.dwg

DESCRIPTION OF WASTE RECOVERY FACILITY 2

APPENDICES

DESCRIPTION OF WASTE RECOVERY FACILITY 2

APPENDIX 2A
WASTE ACCEPTANCE AND HANDLING PLAN

Huntstown Inert Waste Recovery Facility, Finglas, Dublin 11

Restoration and Backfilling of North Quarry

WASTE ACCEPTANCE AND HANDLING PLAN

SLR Ref: 501.00180.00123

June 2016

CONTENTS

APPENDICES

1 INTRODUCTION

1.1 Huntstown Inert Waste Recovery Facility

The Environmental Protection Agency (hereinafter 'the Agency' or 'EPA') issued a waste licence to Roadstone Ltd. (hereinafter 'Roadstone') in respect of an inert waste recovery facility at Huntstown North Quarry, Finglas, Dublin 11 on 11th February 2015 (Ref. W0277-01).

A number of pre-commencement submissions in respect of the soil recovery facility, including a Closure, Restoration and Aftercare Management Plan (CRAMP) and Environmental Liabilities Risk Assessment (ELRA) were submitted to the Agency following the award of the waste licence. These submissions were approved by the Agency and the Financial Provisions required on foot of these were put in place by Roadstone during September 2015. Backfilling and soil recovery activity commenced at the facility in October 2015.

The waste licence provides for

(i) Backfilling of up to 7,295,000 tonnes (approximately 3,840,000m^3) of naturally occurring waste materials, principally excess inert soil, stones and/or broken rock excavated on construction and development sites, to re-use in backfilling and restoring a void created by extraction of bedrock at the North Quarry at Huntstown;

(ii) Separation of any non-inert construction and demolition waste (principally metal, timber, PVC pipes and plastic) unintentionally imported to site;

(iii) Transfer of any separated waste streams to a dedicated waste inspection and quarantine facility for temporary storage, pending inspection, testing and potential removal to off-site to authorised waste disposal or recovery facilities;

(iv) Stockpiling and storage of imported topsoil pending re-use as cover material during final phase of restoration;

(v) Progressive restoration of the backfilled void (including placement of cover soils and seeding) and return to a natural grassland habitat and

(vi) Environmental monitoring of noise, dust, surface water and groundwater for the duration of the proposed site restoration works and for a short aftercare period.

The total volume of backfilled soil required to create the restored landform is approximately 3,840,000m^3. The backfilled materials will be subject to a degree of compactive effort in order to maximise the overall capacity of the proposed recovery facility. An average target compaction density of 1.9t/m^3 assumed for tonnage assessment purposes, gives an overall requirement for approximately 7,295,000 tonnes of inert soil and/or subsoil.

Up to approximately 50,000m^3 (95,000tonnes) of the inert soil and stone required to backfill the quarry and/or reprofile the ground surface may be sourced from existing soil stockpiles and/or screening berms around the application site. All remaining soil and stone to be used in the restoration of the application site will be imported from external construction work sites. These materials are most likely to be sourced from

(i) greenfield development sites (where there has been no significant disturbance or degradation of soil below the upper nutrient rich topsoil layer)

(ii) development sites in previously developed urban areas, beneath a defined zone close to the present day ground surface which has been built up, disturbed or impacted by previous development or land use)

(iii) excavations of buried utilities (specifically stone / gravel / aggregate surround fill)

When the proposed waste facility is operational, small volumes of aggregate will be imported for use in construction of temporary haul road over filled soils as required.

An estimate of the material quantities required to complete backfilling of the application site is provided below: -

Table 1.1
Material Import Requirements

Material	Quantity (tonnes)	Source
Inert subsoil, stones and rock	7,160,000 tonnes	Imported
Stockpiled Soil	95,000 tonnes	In-situ
Aggregate	20,000 tonnes	Imported

1.2 Classes of Licensed Waste Activities

The waste licence issued to Roadstone by the Environmental Protection Agency (EPA) provides for the following licensed activities (as per the Fourth Schedule of the Waste Management Acts 1996 (as amended).

(i) Class R5 : Recycling / reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials (Principal Activity).

(ii) Class R3 : Recycling / reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes) which includes gasification and pyrolysis using the components as chemicals and

(iii) Class R13 : Storage of waste pending any of the operations numbered R1 to R12.

2 WASTE ACCEPTANCE

The excavation and blasting of limestone has been undertaken at the Huntstown Quarry Complex for the past four decades, following grant of an outline permission in or around 1969. It is understood that quarrying at the northern and central areas was commenced at some time in the early-to-mid 1980's, on foot of a planning permission granted in 1982.

In August 2014, Roadstone secured planning permission for continuation of quarrying at its Huntstown Quarry complex for a further 20 year period (Fingal County Council Ref. No FW12A-0022, An Bord Pleanala Ref. No. 06F.241693). The overall development proposal, which was subject to EIA, included provision for ultimate backfilling and restoration of the existing North, West and South Quarries and the planned Central Quarry to original ground level.

At the present time, backfilling and restoration of the North Quarry is proceeding in accordance with the existing planning permission and waste licence. The maximum permitted waste intake is currently 750,000 tonnes per annum.

Only inert waste is recovered at this waste recovery facility. Soil and stones are recovered directly at the facility by placing it on or land without any further processing. No processing or recycling of inert construction and demolition (C&D) waste to produce recycled (or secondary) aggregate takes place at the licenced waste facility.

2.1 Prior Approval of Waste Producers / Waste Collectors

Inert waste (soil and stone) shall only be accepted at the recovery facility from waste producers and/or waste collectors who have been pre-approved by the site operator, Roadstone Ltd.

Approval to import inert waste to the facility shall only be issued to waste producers and/or waste collectors who can demonstrate that they have a valid waste collection permit and have a proven track record in the construction, waste management and/or haulage sectors.

Once approved, each waste collector will be issued with a unique reference code / number which identifies both it and the source site from whence the imported soil and stone originated. This reference code / number must be presented at the weighbridge each time a consignment of inert soil waste is brought to the facility. Failure to present a valid customer code will mean the consignment will be rejected and not permitted to access the facility.

2.2 Basic Characterisation

Basic characterisation is the first step in the waste acceptance procedure and typically constitutes a full characterisation of the waste by gathering all necessary information to facilitate safe recovery in the long term. Basic characterisation is required for each type of waste intake.

The inert materials to be accepted at the site for use in backfilling / recovery activities are identified by their European Waste Catalogue reference number below

EWC Code	Waste Description
17 05 04	Soil and stones other than those mentioned in 17 05 03
20 02 02	Soil and stones

The above listed materials are included on the list of wastes in Clause 2.1.1 in Section 2 of the Annex to Council Decision 2003/33/EC which are assumed to fulfil

(i) the criteria set out for the definition of ***inert waste*** in Article 2(e) of the Landfill Directive (1999/31/EC) and
(ii) the criteria for intake to inert waste landfills listed in Section 2.1.2 of the Annex to 2003/33/EC.

On this basis it is considered reasonable to also assume that materials conforming to the EWC codes listed above (and/or certified as such) can be classified as inert for waste acceptance purposes at the licensed soil recovery facility at Huntstown.

Council Decision 2003/33/EC exempts wastes conforming to these EWC codes from the general requirement for characterisation testing when they are submitted to *a landfill* for inert waste. Notwithstanding this, it is considered prudent when accepting these wastes for intake to a soil recovery facility such as Huntstown, to collect and record some characterisation information in advance, in order to verify that the imported waste is / will be inert and that it will present no risk to underlying ground and/or groundwater.

2.2.1 Intake from Greenfield Sites

In the case of soil and stone being sourced at, and imported from, a greenfield development site, a letter of suitability will be required from an appropriately qualified or competent person which provides the following information to Roadstone prior to forwarding waste consignments to this waste facility

The required letter of suitability will state the following:

(i) The waste is greenfield soil and stone;
(ii) A description of the source and nature of the soil and stone;
(iii) The location of the source of the soil and stone (including a map showing the source site boundary);
(iv) The material is suitable for use as backfill at the facility; and
(v) The material will not cause environmental pollution at the facility.

The producer of the waste and/or the waste collector will be responsible for ensuring that the information provided is correct and pertains to the soil waste being / to be imported to the facility.

Once Roadstone is satisfied on the basis of the information provided to it that the soil wastes to be imported to the facility are inert, it shall issue approval to the waste producer / collector allowing the waste to be recovered at the Huntstown facility.

2.2.2 Intake from Non-Greenfield Sites

The limit values for soil and stone to be accepted at the recovery facility shall be in accordance with those set for inert waste in Section 2.1.2 of the Annex to Council Decision 2003/33 of 19 December 2002 establishing criteria for the acceptance of waste at landfills. Test data shall be provided to confirm that the imported soils are inert and comply with the adopted inert waste acceptance criteria. The limit values for waste intake at the facility as set out in Council Decision 2003/33 are indicated in the table reproduced overleaf.

A copy of Council Decision 2003/33 is reproduced in full in Appendix A.

Limit Values for Inert Waste Intake

Component	Leaching Limit Values *L/S Ratio = 10 l/kg* *mg/kg dry substance*	Limit Value *mg/kg*
Arsenic	0.5	
Barium	20	
Cadmium	0.04	
Chromium (total)	0.5	
Copper	2	
Mercury	0.01	
Molybdenum	0.5	
Nickel	0.4	
Lead	0.5	
Antimony	0.06	
Selenium	0.1	
Zinc	4	
Chloride	800	
Floride	10	
Sulphate	1000	
Phenol Index	1	
Dissolved Organic Carbon	500	
Total Dissolved Solids	4000	
Total Organic Carbon		30,000
BTEX*		6
PCBs**		1
Mineral Oil		500
Polyaromatic Hydrocarbons		100

* Benzene, Toluene, Ethylbenzene and Xylenes

** Polychlorinated Biphenyls

For non-greenfield sites, only soil and stone which has less than 2% contamination with materials of anthropogenic or non-natural origin (such as rubble, concrete, bricks, metal etc.) will be accepted at this facility, as per Table A.2 of Schedule A of the licence.

For non-greenfield source sites where greater than 2,000 tonnes of soil and stone is to be exported off-site to the Huntstown recovery facility, some basic characterisation testing will be sought in advance.

Once Roadstone is satisfied on the basis of the information provided to it that the soil wastes to be imported to the facility are inert, it shall issue approval to the waste producer / collector allowing the waste to be recovered at the Huntstown facility

2.2.3 Restrictions on Intake

The following intake restrictions shall apply at this facility:

(i) consignments containing peat shall not be accepted

(ii) consignments containing soil from known or suspect contaminated sites or sites having a potentially high risk of contamination (eg. garage forecourts or former industrial sites) shall not be accepted

(iii) consignments which could potentially contain asbestos, chemicals or any hazardous materials shall not be accepted

(iv) waste from unknown and/or unrecorded sources shall not be accepted

(v) all inert soil accepted at the facility must have minimal quantities (<2%) of other construction and demolition wastes intermixed with it (eg. metals, plastic, wood, rubber etc.) shall not be accepted.

2.3 Compliance Testing

When wastes have been deemed to be acceptable for recovery at this facility on the basis of a basic characterisation, they shall be subject to subsequent compliance testing to demonstrate that they do in fact comply with basic characterisation and acceptance criteria.

As previously indicated, all waste materials to be accepted at this waste facility are included on the list of wastes in Clause 2.1.1 in Section 2 of the Annex to Council Decision 2003/33/EC which are assumed to fulfil

(i) the criteria set out for the definition of inert waste in Article 2(e) of the Landfill Directive (1999/31/EC) and

(ii) the criteria for intake to inert waste landfills listed in Section 2.1.2 of the Annex to 2003/33/EC.

As such, these wastes are also deemed to be ***exempt*** from the general requirement for compliance testing. Notwithstanding this exemption however, it is again considered prudent to check the imported wastes to ensure compliance with the basic characterisation information provided (which, in the case of soil imported from a greenfield site at least, may not have included any prior quality testing).

In order to verify that the waste being accepted and used for restoration purposes at this recovery facility is inert, Roadstone will undertake compliance testing on soil and stones which have been imported to site. A representative sample of waste shall be taken from one in every 120 loads of soil and stone accepted at the recovery facility (or every 2,000 tonnes). A leachate sample derived from each soil sample (at 10:1 liquid : solid ratio typically) will be subject to compliance testing which for the initial period of operation at least will comprise all contaminant indicators for inert waste identified in Council Decision 2003/33.

Limit values for inert soils shall be in accordance with those set by *Council Decision 2003/33 of 19 December 2002 establishing criteria for the acceptance of waste at landfills*. Test data shall be used to confirm that the imported soils are inert and comply with established waste acceptance criteria.

2.4 On-site Verification

CCTV cameras are mounted around the weighbridge and weighbridge office at Huntstown and will be used to inspect all consignments being imported to the recovery facility. Any waste materials that are deemed to be unacceptable for recovery at the facility on the basis of a visual inspection at the weighbridge will be rejected and directed to an alternative authorised waste facility.

As material is being unloaded, end-tipped and/or stockpiled at the active backfilling face (soil and stones), it shall be subject to further visual inspection by site operatives to ensure that it is consistent with the characterisation data provided and that there is no excessive anthropogenic or non-natural material (<2%) intermixed with it.

If some contamination of soil and stones is immediately evident from visual inspection (unusual colour, smell etc.) or if excessive quantities of construction and demolition waste materials (such as metals, plastic, concrete, bricks, wood, rubber etc.) or other wastes are included, it shall be loaded back onto the HGV and directed off-site.

The waste producer / waste collector who imported the suspect material to site will be advised that no further loads will be accepted from the same source as the suspect material, pending completion of more detailed waste characterisation (potentially including testing) to confirm that all waste generated at the same source is inert and substantially free of other (non-soil and stone) waste.

Testing shall be undertaken at the expense of the waste producer / waste collector. In this instance, characterisation testing shall comprise a minimum of one batch leaching test for parameters listed in Section 2.1.2 of Annex 2 of Council Decision 2003/33/EC.

2.5 Sanctions

If any waste consignment forwarded to the waste recovery facility

(i) fails to comply with the acceptance policy outlined above

(ii) is inconsistent with the basic characterisation information provided

(iii) is discovered or suspected to have unacceptable waste intermixed with it

(iv) does not have a valid approval code on the accompanying documentation

it shall be not be accepted and directed off-site.

A record of the rejection of the waste consignment will be made in the site working folder.

If records indicate that consignments from a particular waste producer and/or waste collector are being repeatedly rejected, Roadstone will review whether or not to withdraw approval for its continued use of the recovery facility.

3 WASTE HANDLING

3.1 Importation of Waste

All soil and stones forwarded for backfilling / recovery purposes to be pre-sorted at source, inert and free of construction or demolition waste or any non-hazardous / hazardous domestic, commercial or industrial wastes.

Only inert soil and stones waste complying with limit values set by *Council Decision 2003/33 of 19 December 2002 establishing criteria for the acceptance of waste at landfills* will be accepted at the waste recovery facility.

Materials shall be accepted at the site between 07.00 hours and 18.00 hours each weekday and on Saturday. No materials shall be accepted at any other time including Sundays and Public Holidays.

All soils imported to the site shall be brought in HGV trucks from the weighbridge at the front of the site directly to the active backfilling face (soil and stones).

Following unloading at the active backfilling area, accepted consignments of soil and stones will immediately be spread and compacted in-situ using a bulldozer.

3.2 Removal of Wastes Off-Site

Any excessive quantities of inert construction and demolition wastes inadvertently imported and accepted at the site will be segregated, stockpiled and transferred to storage skips at the waste quarantine area pending removal off–site to a local authorised construction and demolition waste recovery facility.

Should minor quantities of non-inert wastes (principally metal, timber, PVC pipes and plastic) be inadvertently imported amongst the soil and stones, it too shall be separated out (mechanically or by hand, as appropriate), stockpiled and temporarily stored in skips at the waste quarantine area prior to removal off-site to appropriately authorised waste disposal or recovery facilities

In the unlikely event that suspected contamination of the soil matrix is subsequently identified during the spreading, placement and compaction operations, it will be segregated from the main waste body and transferred to the covered waste inspection and quarantine facility pending closer inspection and testing to establish whether it is inert or not. Suspect waste will be identified on the basis of visual inspection (unusual colour, intermixed wastes etc) or by smell. Detailed records will be kept of all inspections and testing of suspect wastes.

Should inspections and/or testing indicate that the materials transferred to the waste inspection and quarantine facility are non-inert and cannot be accepted and used for restoration purposes at this site, they will be placed in skips and covered pending removal off-site by permitted waste collectors to a suitably permitted (or licensed) waste disposal or recovery facility.

APPENDIX A

COUNCIL DECISION 2003/33 ESTABLISHING CRITERIA FOR THE ACCEPTANCE OF WASTE AT LANDFILLS

COUNCIL

COUNCIL DECISION

of 19 December 2002

establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC

(2003/33/EC)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community,

Having regard to Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste [1], and in particular Article 16 thereof and Annex II thereto,

Whereas:

(1) Pursuant to Article 16 of Directive 1999/31/EC, the Commission is to adopt specific criteria and/or test methods and associated limit values for each class of landfill.

(2) A procedure should be laid down to determine the acceptability of waste at landfills.

(3) Limit values and other criteria should be set for waste acceptable at the different classes of landfills.

(4) The test methods to be used for determining the acceptability of waste at landfills should be determined.

(5) It is appropriate from a technical point of view to exempt from the criteria and procedures set out in the Annex to this Decision those wastes generated by the extractive industry that are deposited on-site.

(6) A suitably short transition period should be granted to Member States to develop the necessary system to apply this Decision and a further brief transition period may be necessary for Member States to ensure the application of the limit values.

(7) The measures provided for in this Decision are not in accordance with the opinion of the Committee established by Article 18 of Council Directive 75/442/EEC of 15 July 1975 on waste [2]. They therefore have to be adopted by the Council in accordance with Article 18(4) of that Directive,

HAS ADOPTED THIS DECISION:

Article 1

This Decision establishes the criteria and procedures for the acceptance of waste at landfills in accordance with the principles set out in Directive 1999/31/EC and in particular Annex II thereto.

Article 2

Member States shall apply the procedure as set out in section 1 of the Annex to this Decision to determine the acceptability of waste at landfills.

Article 3

Member States shall ensure that waste is accepted at a landfill only if it fulfils the acceptance criteria of the relevant landfill class as set out in section 2 of the Annex to this Decision.

Article 4

The sampling and testing methods listed in section 3 of the Annex to this Decision shall be used for determining the acceptability of waste at landfills.

[1] OJ L 182, 16.7.1999, p. 1.

[2] OJ L 194, 25.7.1975, p. 39. Directive as last amended by Commission Decision 96/350/EC (OJ L 135, 6.6.1996, p. 32).

Article 5

Without prejudice to existing Community legislation, the criteria and procedures as set out in the Annex to this Decision shall not apply to waste resulting from prospecting, extraction, treatment and storage of mineral resources nor from the working of quarries, when they are deposited on-site. In the absence of specific Community legislation, Member States shall apply national criteria and procedures.

Article 6

Any amendments necessary for future updating of this Decision to scientific and technical progress shall be adopted by the Commission, assisted by the Committee established under Article 18 of Directive 75/442/EEC, for example adjustment of the parameters in the lists of limit values and/or development of acceptance criteria and limit values for additional subcategories of landfills for non-hazardous waste.

Article 7

1. This Decision shall take effect on 16 July 2004.

2. Member States shall apply the criteria set out in section 2 of the Annex to this Decision by 16 July 2005.

Article 8

This Decision is addressed to the Member States.

Done at Brussels, 19 December 2002.

For the Council

The President

M. FISCHER BOEL

ANNEX

CRITERIA AND PROCEDURES FOR THE ACCEPTANCE OF WASTE AT LANDFILLS

Introduction

This Annex lays down the uniform waste classification and acceptance procedure according to Annex II to Directive 1999/31/EC on the landfill of waste (the 'Landfill Directive').

In accordance with Article 176 of the Treaty, Member States are not prevented from maintaining or introducing more stringent protective measures than those established in this Annex, provided that such measures are compatible with the Treaty. Such measures shall be notified to the Commission. This could be of particular relevance with reference to the limit values for cadmium and mercury in section 2. Member States may also introduce limit values for components not included in section 2.

Section 1 of this Annex lays down the procedure to determine the acceptability of waste at landfills. This procedure consists of the basic characterisation, compliance testing and on-site verification as defined in section 3 of Annex II to the Landfill Directive.

Section 2 of this Annex lays down the acceptance criteria for each landfill class. Waste may be accepted at a landfill only if it fulfils the acceptance criteria of the relevant landfill class as laid down in section 2 of this Annex.

Section 3 of this Annex lists the methods to be used for the sampling and testing of waste.

Appendix A defines the safety assessment to be carried out for underground storage.

Appendix B is an informative Annex providing an overview of the landfill options available within the Directive and examples of possible subcategorisation of landfills' non-hazardous waste.

1. PROCEDURE FOR THE ACCEPTANCE OF WASTE AT LANDFILLS

1.1. Basic characterisation

Basic characterisation is the first step in the acceptance procedure and constitutes a full characterisation of the waste by gathering all the necessary information for a safe disposal of the waste in the long term. Basic characterisation is required for each type of waste.

1.1.1. *Functions of basic characterisation*

(a) Basic information on the waste (type and origin, composition, consistency, leachability and — where necessary and available — other characteristic properties)

(b) Basic information for understanding the behaviour of waste in landfills and options for treatment as laid out in Article 6(a) of the Landfill Directive

(c) Assessing waste against limit values

(d) Detection of key variables (critical parameters) for compliance testing and options for simplification of compliance testing (leading to a significant decrease of constituents to be measured, but only after demonstration of relevant information). Characterisation may deliver ratios between basic characterisation and results of simplified test procedures as well as frequency for compliance testing.

If the basic characterisation of waste shows that the waste fulfils the criteria for a landfill class as laid down in section 2 of this Annex, the waste is deemed to be acceptable at this landfill class. If this is not the case, the waste is not acceptable at this landfill class.

The producer of the waste or, in default, the person responsible for its management, is responsible for ensuring that the characterisation information is correct.

The operator shall keep records of the required information for a period to be defined by the Member State.

1.1.2. *Fundamental requirements for basic characterisation of the waste*

(a) Source and origin of the waste

(b) Information on the process producing the waste (description and characteristics of raw materials and products)

(c) Description of the waste treatment applied in compliance with Article 6(a) of the Landfill Directive, or a statement of reasons why such treatment is not considered necessary

(d) Data on the composition of the waste and the leaching behaviour, where relevant

(e) Appearance of the waste (smell, colour, physical form)

(f) Code according to the European waste list (Commission Decision 2001/118/EC) [1]

(g) For hazardous waste in case of mirror entries: the relevant hazard properties according to Annex III to Council Directive 91/689/EEC of 12 December 1991 on hazardous waste [2]

(h) Information to prove that the waste does not fall under the exclusions of Article 5(3) of the Landfill Directive

(i) The landfill class at which the waste may be accepted

(j) If necessary, additional precautions to be taken at the landfill

(k) Check if the waste can be recycled or recovered.

1.1.3. *Testing*

As a general rule waste must be tested to obtain the above information. In addition to the leaching behaviour, the composition of the waste must be known or determined by testing. The tests used for basic characterisation must always include those to be used for compliance testing.

The content of the characterisation, the extent of laboratory testing required and the relationship between basic characterisation and compliance checking depends on the type of waste. A differentiation can be made between:

(a) wastes that are regularly generated in the same process;

(b) wastes that are not regularly generated.

The characterisations outlined in points (a) and (b) will provide information that can be directly compared with acceptance criteria for the relevant class of landfill and, in addition, descriptive information can be supplied (e.g. the consequences of depositing with municipal waste).

(a) Wastes regularly generated in the same process

These are individual and consistent wastes regularly generated in the same process, where:

— the installation and the process generating the waste are well known and the input materials to the process and the process itself are well defined,

— the operator of the installation provides all necessary information and informs the operator of the landfill of changes to the process (especially changes to the input material).

The process will often be at a single installation. The waste can also be from different installations, if it can be identified as single stream with common characteristics within known boundaries (e.g. bottom ash from the incineration of municipal waste).

For these wastes the basic characterisation will comprise the fundamental requirements listed in section 1.1.2 and especially the following:

— compositional range for the individual wastes,

— range and variability of characteristic properties,

— if required, the leachability of the wastes determined by a batch leaching test and/or a percolation test and/or a pH dependence test,

— key variables to be tested on a regular basis.

[1] OJ L 47, 16.2.2001, p. 1.
[2] OJ L 377, 31.12.1991, p. 20. Directive as last amended by Directive 31/1994/EC (OJ L 168, 2.7.1994, p. 28).

If the waste is produced in the same process in different installations, information must be given on the scope of the evaluation. Consequently, a sufficient number of measurements must be taken to show the range and variability of the characteristic properties of the waste. The waste can then be considered characterised and shall subsequently be subject to compliance testing only, unless significant change in the generation processes occur.

For wastes from the same process in the same installation, the results of the measurements may show only minor variations of the properties of the waste in comparison with the appropriate limit values. The waste can then be considered characterised, and shall subsequently be subject to compliance testing only, unless significant changes in the generation process occur.

Waste from facilities for the bulking or mixing of waste, from waste transfer stations or mixed waste streams from waste collectors, can vary considerably in their properties. This must be taken into consideration in the basic characterisation. Such wastes may fall under case (b).

(b) Wastes that are not regularly generated

These wastes are not regularly generated in the same process in the same installation and are not part of a well-characterised waste stream. Each batch produced of such waste will need to be characterised. The basic characterisation shall include the fundamental requirements for basic characterisation. As each batch produced has to be characterised, no compliance testing is needed.

1.1.4. *Cases where testing is not required*

Testing for basic characterisation can be dispensed with in the following cases:

(a) the waste is on a list of wastes not requiring testing as laid down in section 2 of this Annex;

(b) all the necessary information, for the basic characterisation, is known and duly justified to the full satisfaction of the competent authority;

(c) certain waste types where testing is impractical or where appropriate testing procedures and acceptance criteria are unavailable. This must be justified and documented, including the reasons why the waste is deemed acceptable at this landfill class.

1.2. **Compliance testing**

When waste has been deemed acceptable for a landfill class on the basis of a basic characterisation pursuant to section 1, it shall subsequently be subject to compliance testing to determine if it complies with the results of the basic characterisation and the relevant acceptance criteria as laid down in section 2.

The function of compliance testing is periodically to check regularly arising waste streams.

The relevant parameters to be tested are determined in the basic characterisation. Parameters should be related to basic characterisation information; only a check on critical parameters (key variables), as determined in the basic characterisation, is necessary. The check has to show that the waste meets the limit values for the critical parameters.

The tests used for compliance testing shall be one or more of those used in the basic characterisation. The testing shall consist at least of a batch leaching test. For this purpose the methods listed under section 3 shall be used.

Wastes that are exempted from the testing requirements for basic characterisation in section 1.1.4(a) and section 1.1.4(c) are also exempted from compliance testing. They will, however, need checking for compliance with basic characterisation information other than testing.

Compliance testing shall be carried out at least once a year and the operator must, in any event, ensure that compliance testing is carried out in the scope and frequency determined by basic characterisation.

Records of the test results shall be kept for a period that will be determined by the Member State.

1.3. **On-site verification**

Each load of waste delivered to a landfill shall be visually inspected before and after unloading. The required documentation shall be checked.

For waste deposited by the waste producer at a landfill in his control, this verification may be made at the point of dispatch.

The waste may be accepted at the landfill, if it is the same as that which has been subjected to basic characterisation and compliance testing and which is described in the accompanying documents. If this is not the case, the waste must not be accepted.

Member States shall determine the testing requirements for on-site verification, including where appropriate rapid test methods.

Upon delivery, samples shall be taken periodically. The samples taken shall be kept after acceptance of the waste for a period that will be determined by the Member State (not less than one month; see Article 11(b) of the Landfill Directive.

2. WASTE ACCEPTANCE CRITERIA

This section sets out the criteria for the acceptance of waste at each landfill class, including criteria for underground storage.

In certain circumstances, up to three times higher limit values for specific parameters listed in this section (other than dissolved organic carbon (DOC) in sections 2.1.2.1, 2.2.2, 2.3.1 and 2.4.1, BTEX, PCBs and mineral oil in section 2.1.2.2, total organic carbon (TOC) and pH in section 2.3.2 and loss on ignition (LOI) and/or TOC in section 2.4.2, and restricting the possible increase of the limit value for TOC in section 2.1.2.2 to only two times the limit value) are acceptable, if

— the competent authority gives a permit for specified wastes on a case-by-case basis for the recipient landfill, taking into account the characteristics of the landfill and its surroundings, and

— emissions (including leachate) from the landfill, taking into account the limits for those specific parameters in this section, will present no additional risk to the environment according to a risk assessment.

Member States shall report to the Commission on the annual number of permits issued under this provision. The reports shall be sent to the Commission at intervals of three years as part of the reporting on the implementation of the Landfill Directive in accordance with the specifications laid down in Article 15 thereof.

Member States shall define criteria for compliance with the limit values set out in this section.

2.1. **Criteria for landfills for inert waste**

2.1.1. *List of wastes acceptable at landfills for inert waste without testing*

Wastes on the following short list are assumed to fulfil the criteria as set out in the definition of inert waste in Article 2(e) of the Landfill Directive and the criteria listed in section 2.1.2. The wastes can be admitted without testing at a landfill for inert waste.

The waste must be a single stream (only one source) of a single waste type. Different wastes contained in the list may be accepted together, provided they are from the same source.

In case of suspicion of contamination (either from visual inspection or from knowledge of the origin of the waste) testing should be applied or the waste refused. If the listed wastes are contaminated or contain other material or substances such as metals, asbestos, plastics, chemicals, etc. to an extent which increases the risk associated with the waste sufficiently to justify their disposal in other classes of landfills, they may not be accepted in a landfill for inert waste.

If there is a doubt that the waste fulfils the definition of inert waste according to Article 2(e) of the Landfill Directive and the criteria listed in section 2.1.2 or about the lack of contamination of the waste, testing must be applied. For this purpose the methods listed under section 3 shall be used.

EWC code	Description	Restrictions
1011 03	Waste glass-based fibrous materials	Only without organic binders
1501 07	Glass packagingGlas	
1701 01	Concrete	Selected C & D waste only (*)
1701 02	Bricks	Selected C & D waste only (*)
1701 03	Tiles and ceramics	Selected C & D waste only (*)
1701 07	Mixtures of concrete, bricks, tiles and ceramics	Selected C & D waste only (*)
1702 02	Glass	
1705 04	Soil and stones	Excluding topsoil, peat; excluding soil and stones from contaminated sites
1912 05	Glass	
2001 02	Glass	Separately collected glass only
2002 02	Soil and stones	Only from garden and parks waste; Excluding top soil, peat

(*) Selected construction and demolition waste (C & D waste) with low contents of other types of materials (like metals, plastic, soil, organics, wood, rubber, etc). The origin of the waste must be known.

— No C & D waste from constructions, polluted with inorganic or organic dangerous substances, e.g. because of production processes in the construction, soil pollution, storage and usage of pesticides or other dangerous substances, etc., unless it is made clear that the demolished construction was not significantly polluted.

— No C & D waste from constructions, treated, covered or painted with materials, containing dangerous substances in significant amounts.

Waste not appearing on this list must be subject to testing as laid down under section 1 to determine if it fulfils the criteria for waste acceptable at landfills for inert waste as set out in section 2.1.2.

2.1.2. *Limit values for waste acceptable at landfills for inert waste*

2.1.2.1. Leaching limit values

The following leaching limit values apply for waste acceptable at landfills for inert waste, calculated at liquid to solid ratios (L/S) of 2 l/kg and 10 l/kg for total release and directly expressed in mg/l for C_0 (the first eluate of percolation test at L/S = 0,1 l/kg). Member States shall determine which of the test methods (see section 3) and corresponding limit values in the table should be used.

Component	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
As	0,1	0,5	0,06
Ba	7	20	4
Cd	0,03	0,04	0,02
Cr total	0,2	0,5	0,1

Component	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
Cu	0,9	2	0,6
Hg	0,003	0,01	0,002
Mo	0,3	0,5	0,2
Ni	0,2	0,4	0,12
Pb	0,2	0,5	0,15
Sb	0,02	0,06	0,1
Se	0,06	0,1	0,04
Zn	2	4	1,2
Chloride	550	800	460
Fluoride	4	10	2,5
Sulphate	560 (*)	1 000 (*)	1 500
Phenol index	0,5	1	0,3
DOC (**)	240	500	160
TDS (***)	2 500	4 000	—

(*) If the waste does not meet these values for sulphate, it may still be considered as complying with the acceptance criteria if the leaching does not exceed either of the following values: 1 500 mg/l as C0 at L/S = 0,1 l/kg and 6 000 mg/kg at L/S = 10 l/kg. It will be necessary to use a percolation test to determine the limit value at L/S = 0,1 l/kg under initial equilibrium conditions, whereas the value at L/S = 10 l/kg may be determined either by a batch leaching test or by a percolation test under conditions approaching local equilibrium.

(**) If the waste does not meet these values for DOC at its own pH value, it may alternatively be tested at L/S = 10 l/kg and a pH between 7,5 and 8,0. The waste may be considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 500 mg/kg. (A draft method based on prEN 14429 is available).

(***) The values for total dissolved solids (TDS) can be used alternatively to the values for sulphate and chloride.

2.1.2.2. Limit values for total content of organic parameters

In addition to the leaching limit values under section 2.1.2.1, inert wastes must meet the following additional limit values:

Parameter	Value mg/kg
TOC (total organic carbon)	30 000 (*)
BTEX (benzene, toluene, ethylbenzene and xylenes)	6
PCBs (polychlorinated biphenyls, 7 congeners)	1
Mineral oil (C10 to C40)	500
PAHs (polycyclic aromatic hydrocarbons)	Member States to set limit value

(*) In the case of soils, a higher limit value may be admitted by the competent authority, provided the DOC value of 500 mg/kg is achieved at L/S = 10 l/kg, either at the soil's own pH or at a pH value between 7,5 and 8,0.

2.2. **Criteria for landfills for non-hazardous waste**

Member States may create subcategories of landfills for non-hazardous waste.

In this Annex limit values are laid down only for non-hazardous waste, which is landfilled in the same cell with stable, non-reactive hazardous waste.

2.2.1. *Wastes acceptable at landfills for non-hazardous waste without testing*

Municipal waste as defined in Article 2(b) of the Landfill Directive that is classified as non-hazardous in Chapter 20 of the European waste list, separately collected non-hazardous fractions of household wastes and the same non-hazardous materials from other origins can be admitted without testing at landfills for non-hazardous waste.

The wastes may not be admitted if they have not been subjected to prior treatment according to Article 6(a) of the Landfill Directive, or if they are contaminated to an extent which increases the risk associated with the waste sufficiently to justify their disposal in other facilities.

They may not be accepted in cells, where stable, non-reactive hazardous waste is accepted pursuant to Article 6(c)(iii) of the Landfill Directive.

2.2.2. *Limit values for non-hazardous waste*

The following limit values apply to granular non-hazardous waste accepted in the same cell as stable, non-reactive hazardous waste, calculated at L/S = 2 and 10 l/kg for total release and directly expressed in mg/l for C_0 (in the first eluate of percolation test at L/S = 0,1 l/kg). Granular wastes include all wastes that are not monolithic. Member States shall determine which of the test methods (see section 3) and corresponding limit values in the table should be used.

Components	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
As	0,4	2	0,3
Ba	30	100	20
Cd	0,6	1	0,3
Cr total	4	10	2,5
Cu	25	50	30
Hg	0,05	0,2	0,03
Mo	5	10	3,5
Ni	5	10	3
Pb	5	10	3
Sb	0,2	0,7	0,15
Se	0,3	0,5	0,2
Zn	25	50	15
Chloride	10 000	15 000	8 500

Components	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
Fluoride	60	150	40
Sulphate	10 000	20 000	7 000
DOC (*)	380	800	250
TDS (**)	40 000	60 000	—

(*) If the waste does not meet these values for DOC at its own pH, it may alternatively be tested at L/S = 10 l/kg and a pH of 7,5-8,0. The waste may be considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 800 mg/kg (A draft method based on prEN 14429 is available).
(**) The values for TDS can be used alternatively to the values for sulphate and chloride.

Member States shall set criteria for monolithic waste to provide the same level of environmental protection given by the above limit values.

2.2.3. *Gypsum waste*

Non-hazardous gypsum-based materials should be disposed of only in landfills for non-hazardous waste in cells where no biodegradable waste is accepted. The limit values for TOC and DOC given in sections 2.3.2 and 2.3.1 shall apply to wastes landfilled together with gypsum-based materials.

2.3. **Criteria for hazardous waste acceptable at landfills for non-hazardous waste pursuant to Article 6(c)(iii)**

Stable, non-reactive means that the leaching behaviour of the waste will not change adversely in the long-term, under landfill design conditions or foreseeable accidents:

— in the waste alone (for example, by biodegradation),

— under the impact of long-term ambient conditions (for example, water, air, temperature, mechanical constraints),

— by the impact of other wastes (including waste products such as leachate and gas).

2.3.1. *Leaching limit values*

The following leaching limit values apply to granular hazardous waste acceptable at landfills for non-hazardous waste, calculated at L/S = 2 and 10 l/kg for total release and directly expressed in mg/l for C_0 (the first eluate of percolation test at L/S = 0,1 l/kg). Granular wastes include all wastes that are not monolithic. Member States shall determine which of the test methods and corresponding limit values should be used.

Components	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
As	0,4	2	0,3
Ba	30	100	20
Cd	0,6	1	0,3
Cr total	4	10	2,5

Components	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
Cu	25	50	30
Hg	0,05	0,2	0,03
Mo	5	10	3,5
Ni	5	10	3
Pb	5	10	3
Sb	0,2	0,7	0,15
Se	0,3	0,5	0,2
Zn	25	50	15
Chloride	10 000	15 000	8 500
Fluoride	60	150	40
Sulphate	10 000	20 000	7 000
DOC (*)	380	800	250
TDS (**)	40 000	60 000	—

(*) If the waste does not meet these values for DOC at its own pH, it may alternatively be tested at L/S = 10 l/kg and a pH of 7,5-8,0. The waste may be considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 800 mg/kg (A draft method based on prEN 14429 is available).

(**) The values for TDS can be used alternatively to the values for sulphate and chloride.

Member States shall set criteria for monolithic waste to provide the same level of environmental protection given by the above limit values.

2.3.2. *Other criteria*

In addition to the leaching limit values under section 2.3.1, granular wastes must meet the following additional criteria:

Parameter	Value
TOC (total organic carbon)	5 % (*)
pH	Minimum 6
ANC (acid neutralisation capacity)	Must be evaluated

(*) If this value is not achieved, a higher limit value may be admitted by the competent authority, provided that the DOC value of 800 mg/kg is achieved at L/S = 10 l/kg, either at the material's own pH or at a pH value between 7,5 and 8,0.

Member States must set criteria to ensure that the waste will have sufficient physical stability and bearing capacity.

Member States shall set criteria to ensure that hazardous monolithic wastes are stable and non-reactive before acceptance in landfills for non-hazardous waste.

2.3.3. *Asbestos waste*

Construction materials containing asbestos and other suitable asbestos waste may be landfilled at landfills for non-hazardous waste in accordance with Article 6(c)(iii) of the Landfill Directive without testing.

For landfills receiving construction materials containing asbestos and other suitable asbestos waste the following requirements must be fulfilled:

— the waste contains no other hazardous substances than bound asbestos, including fibres bound by a binding agent or packed in plastic,

— the landfill accepts only construction material containing asbestos and other suitable asbestos waste. These wastes may also be landfilled in a separate cell of a landfill for non-hazardous waste, if the cell is sufficiently self-contained,

— in order to avoid dispersion of fibres, the zone of deposit is covered daily and before each compacting operation with appropriate material and, if the waste is not packed, it is regularly sprinkled,

— a final top cover is put on the landfill/cell in order to avoid the dispersion of fibres,

— no works are carried out on the landfill/cell that could lead to a release of fibres (e.g. drilling of holes),

— after closure a plan is kept of the location of the landfill/cell indicating that asbestos wastes have been deposited,

— appropriate measures are taken to limit the possible uses of the land after closure of the landfill in order to avoid human contact with the waste.

For landfills receiving only construction material containing asbestos, the requirements set out in Annex I, point 3.2 and 3.3 of the Landfill Directive can be reduced, if the above requirements are fulfilled.

2.4. **Criteria for waste acceptable at landfills for hazardous waste**

2.4.1. *Leaching limit values*

The following leaching limit values apply for granular waste acceptable at landfills for hazardous waste, calculated at L/S = 2 and 10 l/kg for total release and directly expressed in mg/l for C_0 (in the first eluate of percolation test at L/S = 0,1 l/kg). Granular wastes include all wastes that are not monolithic. Member States shall determine which of the test methods and corresponding limit values in the table should be used.

Components	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
As	6	25	3
Ba	100	300	60
Cd	3	5	1,7
Cr total	25	70	15
Cu	50	100	60
Hg	0,5	2	0,3
Mo	20	30	10
Ni	20	40	12
Pb	25	50	15

Components	L/S = 2 l/kg	L/S = 10 l/kg	C_0 (percolation test)
	mg/kg dry substance	mg/kg dry substance	mg/l
Sb	2	5	1
Se	4	7	3
Zn	90	200	60
Chloride	17 000	25 000	15 000
Fluoride	200	500	120
Sulphate	25 000	50 000	17 000
DOC (*)	480	1 000	320
TDS (**)	70 000	100 000	—

(*) If the waste does not meet these values for DOC at its own pH, it may alternatively be tested at L/S = 10 l/kg and a pH of 7,5-8,0. The waste may be considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 1 000 mg/kg. (A draft method based on prEN 14429 is available.)
(**) The values for TDS can be used alternatively to the values for sulphate and chloride.

Member States shall set criteria for monolithic waste to provide the same level of environmental protection given by the above limit values.

2.4.2. *Other criteria*

In addition to the leaching limit values under section 2.4.1, hazardous wastes must meet the following additional criteria:

Parameter	Value
LOI (*)	10 %
TOC (*)	6 % (**)
ANC (acid neutralisation capacity)	Must be evaluated

(*) Either LOI or TOC must be used.
(**) If this value is not achieved, a higher limit value may be admitted by the competent authority, provided that the DOC value of 1 000 mg/kg is achieved at L/S = 10 l/kg, either at the material's own pH or at a pH value between 7,5 and 8,0.

2.5. Criteria for underground storage

For the acceptance of waste in underground storage sites, a site-specific safety assessment as defined in Annex A must be carried out. Waste may be accepted only if it is compatible with the site-specific safety assessment.

At underground storage sites for inert waste, only waste that fulfils the criteria set out in section 2.1 may be accepted.

At underground storage sites for non-hazardous waste, only waste that fulfils the criteria set out in section 2.2 or in section 2.3 may be accepted.

At underground storage sites for hazardous waste, waste may be accepted only if it is compatible with the site-specific safety assessment. In this case, the criteria set out in section 2.4 do not apply. However, the waste must be subject to the acceptance procedure as set out in section 1.

3. SAMPLING AND TEST METHODS

Sampling and testing for basic characterisation and compliance testing shall be carried out by independent and qualified persons and institutions. Laboratories shall have proven experience in waste testing and analysis and an efficient quality assurance system.

Member States may decide that:

1. the sampling may be carried out by producers of waste or operators under the condition that sufficient supervision of independent and qualified persons or institutions ensures that the objectives set out in this Decision are achieved;
2. the testing of the waste may be carried out by producers of waste or operators if they have set up an appropriate quality assurance system including periodic independent checking.

As long as a CEN standard is not available as formal EN, Member States will use either national standards or procedures or the draft CEN standard, when it has reached the prEN stage.

The following methods shall be used.

Sampling

For the sampling of waste — for basic characterisation, compliance testing and on-site verification testing — a sampling plan shall be developed according to part 1 of the sampling standard currently developed by CEN.

General waste properties

EN 13137	Determination of TOC in waste, sludge and sediments
prEN 14346	Calculation of dry matter by determination of dry residue or water content

Leaching tests

prEN 14405	Leaching behaviour test - Up-flow percolation test (Up-flow percolation test for inorganic constituents)
EN 12457/1-4	Leaching — Compliance test for leaching of granular waste materials and sludges:
	part 1: L/S = 2 l/kg, particle size < 4 mm
	part 2: L/S = 10 l/kg, particle size < 4 mm
	part 3: L/S = 2 and 8 l/kg, particle size < 4 mm
	part 4: L/S = 10 l/kg, particle size < 10 mm

Digestion of raw waste

EN 13657	Digestion for subsequent determination of aqua regia soluble portion of elements (partial digestion of the solid waste prior to elementary analysis, leaving the silicate matrix intact)
EN 13656	Microwave-assisted digestion with hydrofluoric (HF), nitric (HNO_3) and hydrochloric (HCl) acid mixture for subsequent determination of elements (total digestion of the solid waste prior to elementary analysis)

Analysis

ENV 12506	Analysis of eluates — Determination of pH, As, Ba, Cd, Cl, Co, Cr, CrVI, Cu, Mo, Ni, NO_2, Pb, total S, SO_4, V and Zn (analysis of inorganic constituents of solid waste and/or its eluate; major, minor and trace elements)
ENV 13370	Analysis of eluates — Determination of ammonium, AOX, conductivity, Hg, phenol index, TOC, easily liberatable CN, F (analysis of inorganic constituents of solid waste and/or its eluate (anions))
prEN 14039	Determination of hydrocarbon content in the range of C10 to C40 by gas chromatography

This list will be amended when more CEN standards are available.

For tests and analyses, for which CEN methods are not (yet) available, the methods used must be approved by the competent authorities.

Appendix A

SAFETY ASSESSMENT FOR ACCEPTANCE OF WASTE IN UNDERGROUND STORAGE

1. SAFETY PHILOSOPHY FOR UNDERGROUND STORAGE: ALL TYPES

1.1. The importance of the geological barrier

Isolation of wastes from the biosphere is the ultimate objective for the final disposal of wastes in underground storage. The wastes, the geological barrier and the cavities, including any engineered structures constitute a system that together with all other technical aspects must fulfil the corresponding requirements.

The requirements of the Water Framework Directive (2000/60/EC) can be fulfilled only by demonstrating the long-term safety of the installation (see section 1.2.7). Article 11(3)(j) of Directive 2000/60/EC generally prohibits the direct discharge of pollutants into groundwater. Article 4(1)(b)(i) of Directive 2000/60/EC requires Member States to take measures to prevent the deterioration of the status of all bodies of groundwater.

1.2. Site-specific risk assessment

The assessment of risk requires the identification of:

— the hazard (in this case the deposited wastes),

— the receptors (in this case the biosphere and possibly groundwater),

— the pathways by which substances from the wastes may reach the biosphere, and

— the assessment of impact of substances that may reach the biosphere.

Acceptance criteria for underground storage are to be derived from, *inter alia*, the analysis of the host rock, so it must be confirmed that no site-related conditions specified in Annex I to the Landfill Directive (with an exemption of Annex I(2), (3), (4) and (5)) are of relevance.

The acceptance criteria for underground storage can be obtained only by referring to the local conditions. This requires a demonstration of the suitability of the strata for establishing a storage, i.e. an assessment of the risks to containment, taking into account the overall system of the waste, engineered structures and cavities and the host rock body.

The site specific risk assessment of the installation must be carried out for both the operational and post-operational phases. From these assessments, the required control and safety measures can be derived and the acceptance criteria can be developed.

An integrated performance assessment analysis shall be prepared, including the following components:

1. geological assessment;
2. geomechanical assessment;
3. hydrogeological assessment;
4. geochemical assessment;
5. biosphere impact assessment;
6. assessment of the operational phase;
7. long-term assessment;
8. assessment of the impact of all the surface facilities at the site.

1.2.1. *Geological assessment*

A thorough investigation or knowledge of the geological setting of a site is required. This includes investigations and analyses of kind of rocks, soils and the topography. The geological assessment should demonstrate the suitability of the site for underground storage. The location, frequency and structure of any faulting or fracturing in surrounding geological strata and the potential impact of seismic activity on these structures should be included. Alternative site locations should be considered.

1.2.2. *Geomechanical assessment*

The stability of the cavities must be demonstrated by appropriate investigations and predictions. The deposited waste must be part of this assessment. The processes should be analysed and documented in a systematic way.

The following should be demonstrated:

1. that during and after the formation of the cavities, no major deformation is to be expected either in the cavity itself or at the earth surface which could impair the operability of the underground storage or provide a pathway to the biosphere;

2. that the load-bearing capacity of the cavity is sufficient to prevent its collapse during operation;

3. that the deposited material must have the necessary stability compatible with the geo-mechanical properties of the host rock.

1.2.3. *Hydrogeological assessment*

A thorough investigation of the hydraulic properties is required to assess the groundwater flow pattern in the surrounding strata based on information on the hydraulic conductivity of the rock mass, fractures and the hydraulic gradients.

1.2.4. *Geochemical assessment*

A thorough investigation of the rock and the groundwater composition is required to assess the present groundwater composition and its potential evolution over time, the nature and abundance of fracture filling minerals, as well as a quantitative mineralogical description of the host rock. The impact of variability on the geochemical system should be assessed.

1.2.5. *Biosphere impact assessment*

An investigation of the biosphere that could be impacted by the underground storage is required. Baseline studies should be performed to define local natural background levels of relevant substances.

1.2.6. *Assessment of the operational phase*

For the operational phase, the analysis should demonstrate the following:

1. the stability of the cavities as in section 1.2.2;

2. no unacceptable risk of a pathway developing between the wastes and the biosphere;

3. no unacceptable risks affecting the operation of the facility.

When demonstrating operational safety, a systematic analysis of the operation of the facility must be made on the basis of specific data on the waste inventory, facility management and the scheme of operation. It is to be shown that the waste will not react with the rock in any chemical or physical way, which could impair the strength and tightness of the rock and endanger the storage itself. For these reasons, in addition to wastes that are banned by Article 5(3) of the Landfill Directive, wastes that are liable to spontaneous combustion under the storage conditions (temperature, humidity), gaseous products, volatile wastes, wastes coming from collections in the form of unidentified mixtures should not be accepted.

Particular incidents that might lead to the development of a pathway between the wastes and the biosphere in the operational phase should be identified. The different types of potential operational risks should be summarised in specific categories. Their possible effects should be evaluated. It should be shown that there is no unacceptable risk that the containment of the operation will be breached. Contingency measures should be provided.

1.2.7. *Long-term assessment*

In order to comply with the objectives of sustainable landfilling, risk assessment should cover the long-term. It must be ascertained that no pathways to the biosphere will be generated during the long-term post-operation of the underground storage.

The barriers of the underground storage site (e.g. the waste quality, engineered structures, back filling and sealing of shafts and drillings), the performance of the host rock, the surrounding strata and the overburden should be quantitatively assessed over the long-term and evaluated on the basis of site-specific data or sufficiently conservative assumptions. The geochemical and geohydrological conditions such as groundwater flow (see sections 1.2.3 and 1.2.4), barrier efficiency, natural attenuation as well as leaching of the deposited wastes should be taken into consideration.

The long-term safety of an underground storage should be demonstrated by a safety assessment comprising a description of the initial status at a specified time (e.g. time of closure) followed by a scenario outlining important changes that are expected over geological time. Finally, the consequences of the release of relevant substances from the underground storage should be assessed for different scenarios reflecting the possible long-term evolution of the biosphere, geosphere and the underground storage.

Containers and cavity lining should not be taken into account when assessing the long-term risks of waste deposits because of their limited lifetime.

1.2.8. *Impact assessment of the surface reception facilities*

Although the wastes taken at the site may be destined for subsurface disposal, wastes will be unloaded, tested and possibly stored on the surface, before reaching their final destination. The reception facilities must be designed and operated in a manner that will prevent harm to human health and the local environment. They must fulfil the same requirements as any other waste reception facility.

1.2.9. *Assessment of other risks*

For reasons of protection of workers, wastes should be deposited only in an underground storage securely separated from mining activities. Waste should not be accepted if it contains, or could generate, hazardous substances which might harm human health, e.g. pathogenic germs of communicable diseases.

2. ACCEPTANCE CRITERIA FOR UNDERGROUND STORAGE: ALL TYPES

2.1. **Excluded wastes**

In the light of sections 1.2.1 to 1.2.8, wastes that may undergo undesired physical, chemical or biological transformation after they have been deposited must not be disposed of in underground storage. This includes the following:

(a) wastes listed in Article 5(3) of the Landfill Directive;

(b) wastes and their containers which might react with water or with the host rock under the storage conditions and lead to:

— a change in the volume,

— generation of auto-flammable or toxic or explosive substances or gases, or

— any other reactions which could endanger the operational safety and/or the integrity of the barrier.

Wastes which might react with each other must be defined and classified in groups of compatibility; the different groups of compatibility must be physically separated in the storage;

(c) wastes that are biodegradable;

(d) wastes that have a pungent smell;

(e) wastes that can generate a gas-air mixture which is toxic or explosive. This particularly refers to wastes that:

— cause toxic gas concentrations due to the partial pressures of their components,

— form concentrations when saturated within a container, which are higher than 10 % of the concentration which corresponds to the lower explosive limit;

(f) wastes with insufficient stability to correspond to the geomechanical conditions;

(g) wastes that are auto-flammable or liable to spontaneous combustion under the storage conditions, gaseous products, volatile wastes, wastes coming from collections in the form of unidentified mixtures;

(h) wastes that contain, or could generate, pathogenic germs of communicable diseases (already provided for by Article 5(3)(c) of the Landfill Directive).

2.2. **Lists of waste suitable for underground storage**

Inert wastes, hazardous and non-hazardous wastes, not excluded by sections 2.1 and 2.2 may be suitable for underground storage.

Member States may produce lists of wastes acceptable at underground storage facilities in accordance with the classes given in Article 4 of the Landfill Directive.

2.3. **Site-specific risk assessment**

Acceptance of waste at a specific site must be subject to site-specific risk assessment.

The site-specific assessments outlined in section 1.2 for the wastes to be accepted at an underground storage should demonstrate that the level of isolation from the biosphere is acceptable. The criteria have to be fulfilled under storage conditions.

2.4. **Acceptance conditions**

Wastes can be deposited only in an underground storage securely separated from mining activities.

Wastes that might react with each other must be defined and classified in groups of compatibility; the different groups of compatibility must be physically separated in the storage.

3. ADDITIONAL CONSIDERATIONS: SALT MINES

3.1. **Importance of the geological barrier**

In the safety philosophy for salt mines, the rock surrounding the waste has a two-fold role:

— it acts as host rock in which the wastes are encapsulated;

— together with the overlying and underlying impermeable rock strata (e.g. anhydrite), it acts as a geological barrier intended to prevent groundwater entering the landfill and, where necessary, effectively to stop liquids or gases escaping from the disposal area. Where this geological barrier is pierced by shafts and boreholes, these must be sealed during operation to secure against ingress of water, and must be hermetically closed after the underground landfill ceases to operate. If mineral extraction continues longer than the landfill operation, the disposal area must, after the landfill has ceased operating, be sealed with a hydraulically impermeable dam which is constructed according to the calculated hydraulically operative pressure corresponding to the depth, so that water which may seep into the still operating mine cannot penetrate through to the landfill area;

— in salt mines, the salt is considered to provide total containment. The wastes will only make contact with the biosphere in the case of an accident or an event in geological time such as earth movement or erosion (for example, associated with sea-level rise). The waste is unlikely to change in storage, and the consequences of such failure scenarios must be considered.

3.2. **Long-term assessment**

The demonstration of long-term safety of underground disposal in a salt rock should be principally undertaken by designating the salt rock as the barrier rock. Salt rock fulfils the requirement of being impermeable to gases and liquids, of being able to encase the waste because of its convergent behaviour and of confining it entirely at the end of the transformation process.

The convergent behaviour of the salt rock thus does not contradict the requirement to have stable cavities in the operation phase. The stability is important, in order to guarantee the operational safety and in order to maintain the integrity of the geological barrier over unlimited time, so that there is continued protection of the biosphere. The wastes should be isolated permanently from the biosphere. Controlled subsidence of the overburden or other defects over long time are acceptable only if it can be shown, that only rupture-free transformations will occur, the integrity of the geological barrier is maintained and no pathways are formed by which water would be able to contact the wastes or the wastes or components of the waste migrate to the biosphere.

4. ADDITIONAL CONSIDERATIONS: HARD ROCK

Deep storage in hard rock is here defined as an underground storage at several hundred metres depth, where hard rock includes various igneous rocks, e.g. granite or gneiss, it may also include sedimentary rocks, e.g. limestone and sandstone.

4.1. **Safety philosophy**

A deep storage in hard rock is a feasible way to avoid burdening future generations with the responsibility of the wastes since it should be constructed to be passive and with no need for maintenance. Furthermore, the construction should not obstruct recovery of the wastes or the ability to undertake future corrective measures. It should also be designed to ensure that negative environmental effects or liabilities resulting from the activities of present generations do not fall upon future generations.

In the safety philosophy of underground disposal of wastes, the main concept is isolation of the waste from the biosphere, as well as natural attenuation of any pollutants leaking from the waste. For certain types of hazardous substances and waste, a need has been identified to protect the society and the environment against sustained exposure over extended periods of time. An extended period of time implies several thousands of years. Such levels of protection can be achieved by deep storage in hard rock. A deep storage for waste in hard rock can be located either in a former mine, where the mining activities have come to an end, or in a new storage facility.

In the case of hard-rock storage, total containment is not possible. In this case, an underground storage needs to be constructed so that natural attenuation of the surrounding strata mediates the effect of pollutants to the extent that they have no irreversible negative effects on the environment. This means that the capacity of the near environment to attenuate and degrade pollutants will determine the acceptability of a release from such a facility.

The requirements of the EU Water Framework Directive (2000/60/EC) can only be fulfilled by demonstrating the long-term safety of the installation (see section 1.2.7). The performance of a deep storage system must be assessed in a holistic way, accounting for the coherent function of different components of the system. In a deep storage in hard rock, the storage will reside below the groundwater table. Article 11(3)(j) of the Directive generally prohibits the direct discharge of pollutants into groundwater. Article 4(1)(b)(i) of the Directive requires Member States to take measures to prevent the deterioration of the status of all bodies of groundwater. For a deep storage in the hard rock, this requirement is respected in that any discharges of hazardous substances from the storage will not reach the biosphere, including the upper parts of the groundwater system accessible for the biosphere, in amounts or concentrations that will cause adverse effects. Therefore the water flow paths to and in the biosphere should be evaluated. The impact of variability on the geohydraulic system should assessed.

Gas formation may occur in deep storage in hard rock due to long-term deterioration of waste, packaging and engineered structures. Therefore, this must be considered in the design of premises for a deep storage in hard rock.

Appendix B

OVERVIEW OF LANDFILLING OPTIONS PROVIDED BY THE LANDFILL DIRECTIVE

Introduction

Figure 1 gives an overview of the landfilling possibilities for waste provided by the Landfill Directive together with some examples of subcategories of the main classes of landfills. The starting point (upper left corner) is a waste which should be landfilled. In accordance with Article 6(a) of the Landfill Directive, some treatment is required prior to landfilling for most wastes. The general definition of 'treatment' is relatively broad and to a large extent left to the competent authorities in the Member States. It is assumed that the waste does not belong to any of the categories listed in Article 5(3) of the Landfill Directive.

Inert-waste landfill

The first question to ask could be whether or not the waste is classified as hazardous. If the waste is not hazardous (according to the Hazardous Waste Directive (91/689/EC) and the current waste list), the next question could be whether or not the waste is inert. If it meets the criteria for waste to be landfilled at an inert landfill (class A, see figure 1 and table 1), the waste may be placed at an inert landfill.

Inert waste may alternatively be placed in landfills for non-hazardous waste provided it fulfils the appropriate criteria (which it generally should).

Non-hazardous waste landfill including subcategories

If the waste is neither hazardous nor inert, then it must be non-hazardous, and it should go to a landfill for non-hazardous waste. Member States may define subcategories of landfills for non-hazardous waste in accordance with their national waste management strategies as long as the requirements of the Landfill Directive are met. Three major subcategories of non-hazardous waste landfills are shown in figure 1: landfill for inorganic waste with low organic/biodegradable content (B1), landfill for organic waste (B2), and landfill for mixed non-hazardous waste with substantial contents of both organic/biodegradable and inorganic materials. Category B1 sites can be subdivided further into sites for wastes that do not meet the criteria set out in section 2.2.2 for inorganic non-hazardous wastes that may be co-disposed with stable, non reactive hazardous wastes (B1a) and sites for wastes that do meet those criteria (B1b). Category B2 sites may, for example, be further subdivided into bioreactor landfills and landfills for less reactive, biologically treated waste. Further subclassification of non-hazardous landfills may be desired by some Member States, and monofills and landfills for solidified/monolithic waste may be defined within each subcategory (see the footnote below table 1). National acceptance criteria may be developed by the Member States to ensure proper allocation of non-hazardous waste to the various subcategories of non-hazardous waste landfills. If sub-classification of non-hazardous waste landfills is not desired, all non-hazardous waste (subject of course to the provisions of Articles 3 and 5 of the Landfill Directive) may go to a landfill for mixed non-hazardous waste (class B3).

Placement of stable, non-reactive hazardous waste in landfill for non-hazardous waste

If the waste is hazardous (according to Directive 91/689/EC and the current waste list), the treatment may have enabled the waste to meet the criteria for placement of stable, non-reactive hazardous waste in non-hazardous waste landfills within cells for inorganic waste with low organic/biodegradable content that meet the criteria in section 2.2.2 (class B1b). The waste may be granular (rendered chemically stable) or solidified/monolithic.

Hazardous waste landfill

If the hazardous waste does not meet the criteria for placement in a class B1b landfill or cell for non-hazardous waste, the next question could be whether or not it meets the criteria for acceptance at a landfill for hazardous waste (class C). If the criteria are met, then the waste may be placed at a hazardous waste landfill.

If the criteria for acceptance at a hazardous waste landfill are not met, the waste may be subjected to further treatment and tested again against the criteria, until they are met.

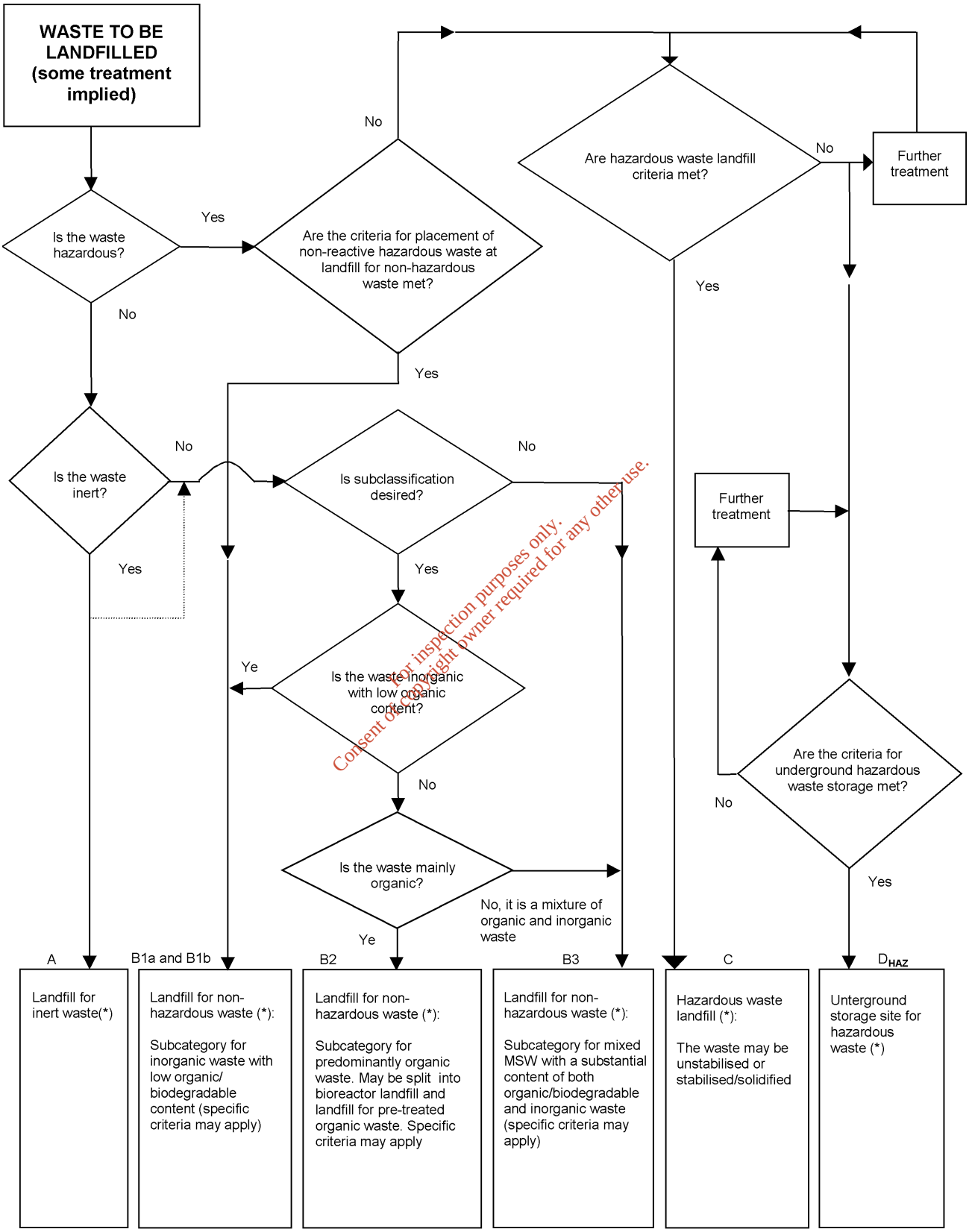
Underground storage

Alternatively, the waste may be tested against the criteria for underground storage. If the criteria are met, the waste may go to an underground storage facility for hazardous waste (landfill class D_{HAZ}). If the underground storage criteria are not met, the waste may be subjected to further treatment and tested again.

Although underground storage is likely to be reserved for special hazardous wastes, this subcategory may in principle be used also for inert waste (class D_{INERT}) and non-hazardous waste (class $D_{NON-HAZ}$).

Figure 1

Diagram showing the landfilling options provided by the Landfill Directive



(*) In principle, underground storage is also possible for inert and non-hazardous waste.

Table 1

Overview of landfill classes and examples of subcategories

Landfill class	Major subcategories (underground storage facilities, monofills and landfills for solidified, monolithic (*) waste possible for all landfill classes)	ID	Acceptance criteria
Landfill for inert waste	Landfill accepting inert waste	A	Criteria for leaching and for content of organic components are set at EU level (section 2.1.2). Criteria for content of inorganic components may be set at Member State level.
Landfill for non-hazardous waste	Landfill for inorganic non-hazardous waste with a low content of organic/biodegradable matter, where the wastes do not meet the criteria set out in section 2.2.2. for those inorganic non-hazardous wastes that may be landfilled together with stable, non-reactive hazardous waste	B1a	Criteria for leaching and total content are not set at EU level
	Landfill for inorganic non-hazardous waste with a low content of organic/biodegradable matter	B1b	Criteria for leaching and content of organics (TOC) and other properties are set at EU level, common for granular non-hazardous waste and for stable, non-reactive hazardous waste (section 2.2). Additional stability criteria for the latter are to be set at Member State level. Criteria for monolithic waste must be set at Member State level
	Landfill for organic non-hazardous waste	B2	Criteria for leaching and total content are not set at EU level
	Landfill for mixed non-hazardous waste with substantial contents of both organic/biodegradable waste and inorganic waste.	B3	Criteria for leaching and total content are not set at EU level
Landfill for hazardous waste	Surface landfill for hazardous waste	C	Criteria for leaching for granular hazardous waste and total content of certain components have been laid down at EU level (section 2.4). Criteria for monolithic waste must be set at Member State level Additional criteria on content of contaminants can be set at MS level
	Underground storage site	D_{HAZ}	Special requirements at EU level are listed in Annex A

(*) Monolithic waste subcategories are only relevant for B1, C and D_{HAZ}, and possibly A.