20 October 2010

Licensing Unit
Office of Climate Change, Licensing and Resource Use
Environmental Protection Agency
Headquarters,
P.O. Box 3000,
Johnstown Castle Estate
County Wexford

Our Ref: 501.00059.00017
Your Ref : W0269-01

Dear Sir/ Madam

RE: ROADSTONE WOOD LIMITED : WASTE LICENCE APPLICATION W0269-01
FASSAROE WASTE RECOVERY FACILITY
RESPONSE TO SECTION 16 REQUEST FOR FURTHER INFORMATION

Further to your letter dated 7 October last issued in accordance with Article 16(1) of the Waste Management (Licensing) Regulations, we have herein provided a Water Management Plan which presents the further information, particulars and evidence requested in respect of surface water management arrangements at the site of the proposed inert waste recovery facility at Fassaroe.

A number of sections of the Environmental Impact Statement and the Waste Licence Application have been revised to take account of the additional information provided in response to your letter dated 7 October 2010 and are also forwarded under cover of this letter. The revised documents include

(i) Non Technical Summary of Environmental Impact Statement
(ii) Section 2 of the Environmental impact Statement (Description of Waste Recovery Facility)
(iii) Section 6 of Environmental Impact Statement (Water)
(iv) Attachment A of the Waste Licence Application (Non Technical Summary)
(v) Attachment E1 of the Waste Licence Application
(vi) Attachment F4 of the Waste Licence Application
(vii) Attachment I1 of the Waste Licence Application
(viii) Attachment I3 of the Waste Licence Application
(ix) Drawing 2.2A (Rev 0) of the Environmental Impact Statement
(x) Drawing 2.11 (Rev 1) of the Environmental Impact Statement
(xi) Drawing F4.1 (Rev 1) of the Waste Licence Application

The revised documents should replace the original documents previously provided in the Environmental Impact Statement and Waste Licence Application.

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As requested we have provided

- 3 No. paper (hard) copies of the Surface Water Management Plan and all revised documents itemised above
- 16 No electronic (soft) copies of a CD-ROM with the Surface Water Management Plan and all revised document and drawings listed above in *.pdf* format.
- A formal document and drawing transmittal sheet

We trust that the additional information provided adequately addresses the issues raised in your letter and that you will shortly be in a position to issue a proposed determination on this waste licence application.

Yours sincerely
SLR Consulting Ireland

Derek Luby
Technical Director

cc Ronan Griffin (Roadstone Wood)

Enc

SLR	SLR CONSULTING LIMITED	DRAWING / DOCUMENT ISSUE SHEET

PROJECT: FASSAROE INERT WASTE RECOVERY FACILITY | JOB NO: 501.00059.000

DRAWINGS, CALCULATION SHEETS AND OTHER DESIGN DOCUMENTS REGISTER

DRG No	DESCRIPTION	CREATION/ISSUE DATE: 20.10.10
		REVISION STATUS
0059.00017.18Fig2.2A.R0	Proposed Surface Water Management Arrangements	0
0059.00017.18Fig2.11.R1	Env Monitoring Locations	1
0059.00017.18Fig4.1.R1	SWMonitoring Locations	1

DOCUMENT NUMBER	DESCRIPTION	
101018 501.00059.00017	_R_Water Management Plan	0
	Fassaroe Inert Waste Recovery EIS : Non Technical Summary	A
	Fassaroe Inert Waste Recovery EIS : Section 2 Description	A
	Fassaroe Inert Waste Recovery EIS : Section 6 Water	A
	Fassaroe Waste Licence Attachment A	Fassaroe Waste Licence Attachment E1
	Fassaroe Waste Licence Attachment E1	A
	Fassaroe Waste Licence Attachment E2	A
	Fassaroe Waste Licence Attachment I1	A
	Fassaroe Waste Licence Attachment I3	A

ISSUE TO:		NO. OF COPIES: Hard Copy / Electronic Copy
Michael Owens	Environmental Protection Agency	3/16
Ronan Griffin	Roadstone Wood	1/0
SLR Office	Dublin	1/0
ISSUED BY (INITIAL)		DL

COMMENTS:

'X' not included
'-' original

INERT WASTE RECOVERY FACILITY
FASSAROE, BRAY, CO. WICKLOW
(Ref. No. W0269-01)

WATER MANAGEMENT PLAN
(Response to EPA Letter dated 7 October2010)

OCTOBER 2010

Prepared by :
SLR Consulting Ireland
7 Dundrum Business Park
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Wexford 14

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FIGURES

1 BACKGROUND

Roadstone Wood Limited has applied to the Environmental Protection Agency (EPA) for a Waste Licence in respect of its existing soil recovery and construction and demolition waste recycling facility at it landholding at Fassaroe, Bray, Co. Wicklow.

The inert waste recovery facility is co-located with an existing concrete production facility on the same landholding and shares existing site infrastructure with it, including site offices, staff facilities, internal roads, weighbridge, environmental control / monitoring infrastructure and maintenance sheds.

The inert waste recovery facility at Fassaroe, Bray Co. Wicklow, the location of which is shown on Figure RFI1, will provide for

(i) Use of approximately 750,000 tonnes of imported and/or site won inert natural materials, principally excess soil, stones and/or broken rock excavated on construction sites, to backfill and restore a large existing void created by previous extraction of sand and gravel
(ii) Recovery of imported inert construction materials, including stones, granular fill, concrete, blocks, bricks and ceramic tile, using crushing and screening equipment to generate secondary (recycled) aggregate
(iii) Separation of any non-inert construction and demolition waste (principally metal, timber, PVC pipes and plastic) unintentionally imported to site prior to removal off-site to appropriately licensed waste disposal or recovery facilities
(iv) Use of secondary aggregate to construct internal haul roads within and across the application site
(v) Sale and export of secondary aggregate off-site for re-use by others
(vi) Phased restoration of the backfilled void (including placement of cover soils and seeding) and return to use as agricultural grassland
(vii) Temporary stockpiling of topsoil and subsoil pending re-use as cover material for phased restoration of the site
(viii) Environmental monitoring of noise, dust, surface water and groundwater for the duration of the site restoration works.

The existing quarry void will only be infilled using inert materials imported from pre-approved external construction sites and secondary aggregate generated on site. No peat, contaminated soils intermixed construction and demolition waste or non-hazardous waste will be accepted at the proposed waste recovery facility. Any non-inert construction and demolition waste will be removed off-site. The location and existing layout of the application site is indicated on Figures RFI1 and RFI2 respectively.

The worked-out pit at Fassaroe and the surrounding land is zoned for future mixed use development by the Bray Environs Local Area Plan (2009-2015). The pit must be backfilled and the surrounding area restored to its pre-extraction landform before any prospective development can begin.

In considering the waste licence application, the EPA has requested that greater and more definite detail be provided in respect of the existing and proposed arrangements for management of surface water at the application site, specifically in respect of management of rainwater ponds and silt ponds.

This water management plan addresses the request for further information requested in the EPA's letter dated 7 October 2010 and

(i) provides details of existing site infrastructure and surface water management operations at Fassaroe (Section 2) and
(ii) presents proposals for upgrading of existing environmental infrastructure and modifying water management practices for the proposed inert waste recovery facility (Section 3).

2 EXISTING WATER MANAGEMENT PRACTICES

2.1 Hydrological and Hydrological Setting

Roadstone Wood's lands at Fassaroe are located over a locally important sand and gravel aquifer. As the soil and subsoil underlying the landholding are relatively permeable, much of the incipient rain which falls on it percolates directly through the unvegetated, unsealed ground to the underlying groundwater aquifer.

There is relatively little over ground run-off around the 65 hectare landholding, and as a result, there is a complete absence of drainage ditches, natural streams or watercourses within it. The nearest watercourse to the landholding, the Cookstown River, is a tributary of the River Dargle. It runs along and beyond the southern boundary of Roadstone Wood's landholding, at a ground level (40mOD) approximately 30m-35m below the floor of the worked out sand and gravel pit to be backfilled (70mOD to 75mOD). All existing surface water ponds within the landholding occur within closed depressions and are considered to be perched groundwater features.

Data presented in the water chapter of the EIS accompanying the waste licence application indicates that:

- The silt ponds on the floor of the worked-out pit being backfilled comprise rainwater which is perched approximately 5m to 7m above the groundwater table
- The lack of surface water features and high recharge acceptance indicates the upper part of the sand and gravel deposit has relatively high permeability
- The hydraulic gradient for the groundwater table is relatively steep for a sand and gravel deposit, which suggests that the deeper part of the deposit (beneath the pit floor) has a lower permeability. This is suggestive of higher silt content and may explain why extraction activities at the worked out pit ceased at the level that they did (too high a silt content would mean it is uneconomic to extract and process the sand).

2.2 Silt Ponds

Roadstone Wood's lands at Fassaroe extend across a number of worked-out sand and gravel pits. No sand and gravel extraction has taken place at the landholding for over 10 years. Concrete was historically produced at this location when much of the required sand and gravel was being extracted at surrounding pits. When reserves of sand and gravel were eventually exhausted at the site, the sand required for concrete production was imported by road from other Roadstone pits in the Greater Dublin or wider Leinster area. As the silt (fines) content of the imported sand was often higher than limits set by concrete specifications, it was necessary to process it (by washing) to remove the silt fraction.

Wet processing of imported sand has been ongoing at Fassaroe for many years. In that time, silt fines and water generated by the washing process have been pumped to the floor of the worked out pit on the eastern side of proposed waste licence application area. Initially water would have drained slowly through the underlying unsaturated ground and silt fines would have built up gradually at low points across the former pit floor. Given its relatively low permeability, the silt impeded recharge of rainfall through the former pit floor to the groundwater table which, as noted in the EIS, lies approximately 5m to 7m below.

Over time, two ponds (designated the northern and southern silt pond) formed at low points on the pit floor and their area increased as the extent and depth of silt deposition increased. Where silt fines were discharged at higher points across the pit floor principally (in the central area), water drained away and the silt dried out. Once sufficient volume of water accumulated in the two silt ponds, Roadstone began to recycle it continuously for sand washing purposes, reducing the need to source water from the supply pond to the west of the site and/or the Cookstown River.

Wet processing of sand ceased at Fassaroe in 2009. In future, only pre-processed (washed) sand will be imported to the site for concrete production purposes. The location of the sand washing plant, the water abstraction pump, the silt ponds and the supply pond are all shown on Figure RFI2.

As the silt ponds lie within a closed depression, there is no overground drainage of water out of them. At no time was water in the silt ponds ever discharged to other water bodies across Roadstone Wood's landholding or to the Cookstown River. Water level in the silt ponds have been observed to vary seasonally, according as the volume of rainfall reduced and water either evaporated or drained slowly through the unsaturated soils under and/or around the sides of the pit to the underlying groundwater aquifer.

There was no active diversion or monitoring of water in the silt ponds prior to the commencement of backfilling activities at the pit under the terms of a waste permit issued by Wicklow County Council in March 2009. At that time, water was pumped from the northern silt pond to the lower lying (southern) silt pond to facilitate backfilling activity using inert soil.

Testing of water samples from the silt ponds and groundwater samples taken from groundwater monitoring wells installed in 2008 indicated that the sand processing activities had no detrimental impact on the quality of water in the silt ponds or on groundwater at a deeper level. Further detail on water quality testing at Fassaroe is provided in the EIS accompanying the waste licence application.

2.3 Supply Pond

The concrete production plant at Fassaroe is located in a closed depression, understood to be a worked out pit, at the western end of the proposed waste licence application area. The water required for concrete production is sourced from a body of water identified as the 'supply pond' immediately south of the concrete production area, refer to Figure RFI2. It is believed, given the relatively steep sided banks which surround it, that the supply pond lies within another worked out sand and gravel pit.

The supply pond occurs at a higher level to the adjoining concrete production area and is fed by water pumped from the Cookstown River and surface water run-off from the sealed concrete floor of the concrete production area. In the 'Celtic Tiger' years, water had to be pumped to the supply pond on a continuous basis from the Cookstown River to provide sufficient water for concrete production and sand washing purposes. With the marked fall off in construction activity in recent years however and the cessation of sand washing at Fassaroe, existing storage and replenishment of the supply pond with surface water run-off from the concrete yard has provided sufficient water for concrete production purposes and it has not been necessary to supplement it with water from the Cookstown River.

As the supply pond lies within a closed depression, there is no overground drainage of water out of the pond. The level of the former pit floor and the base of the existing pond have not been verified. The available evidence, including the relatively flat gradient of the exposed pit floor to the east of the pond and the floor level of the former pit to the north, suggest it is likely to be at or around 85mOD. The available groundwater contour data (presented in the waste chapter of the EIS accompanying the waste licence application) suggests that at this level, the base of the supply pond lies approximately 19m to 20m above the underlying groundwater aquifer.

There is no evidence at the present time of seepage from the supply pond (water level approximately 90mOD) through the ground to the lower lying concrete production area to the north (floor level approximately 85mOD). The supply pond retains water due to a combination of

(i) being underlain by a relatively low permeability deposit (which would have discouraged deeper excavation and extraction) and/or
(ii) being sealed by fines generated by previous aggregate processing and/or production activities at the site.

At the present time, water in the supply pond is ultimately either recycled for concrete production purposes or discharges slowly through the unsaturated subsoil beneath and/or around the sides of the supply pond to the underlying groundwater aquifer.

2.4 Surface Water Run-off

Surface water run-off across Roadstone Wood's landholding at Fassaroe is only generated where the ground surface has been sealed by concrete, principally the concrete production yard, the block yard, the retail and parking area and the paved road. In all other areas, rainfall percolates directly into the ground.

The proposed waste inspection and quarantine area is to be located in an unused shed in the north-western corner of the concrete production yard on the western side of the waste licence application area. The production yard is sealed by a concrete slab which covers an area of approximately 9000m^2. The concrete surface falls uniformly from the north and east to the south and west. Surface water run-off falls toward two sumps at low points in the south-western corner of the production area, indicated in Figure RFI2.

Surface water run-off collecting in a sump in the extreme south-western corner of the production area is currently pumped via a submersible sump at a nearby pumphouse directly to the supply pond. Surface water run-off collecting at a sump in front of the concrete batching plant is pumped directly to the supply pond. These pumps operate intermittently and pumping is triggered when ponded water reaches a preset level or after a preset period of time has elapsed. At the present time, silt settles around the sump areas and is removed periodically as it builds up.

The absence of any form of treatment of run-off from the concrete production area means that there is a risk that a fuel spillage or leakage of hydraulic fuel across the concrete production yard could contaminate the surface water run-off and ultimately be discharged to the supply pond. While any contaminated run-off would be diluted in the supply pond and could ultimately be recycled in concrete production, there is a residual risk that some contaminated water could discharge though the base and sides of the supply pond and the underlying unsaturated soil to the groundwater table some 20m below. Measures to address this risk are incorporated into the proposed water management system for the waste recovery operation, presented in Section 3.3.3 of this plan.

2.5 Flooding

As indicated in the EIS which accompanied the waste licence application, the Office of Public Works website (www.floodmaps.ie) indicates that there are no records of historic flooding within 1km of the Fassaroe site. This is corroborated by Roadstone Wood staff at Fassaroe.

The proposed Waste Quarantine and Inspection Area intended to service the Waste Recovery Facility comprises an unused covered shed, open on one side within the confines of the existing concrete production yard at Fassaroe, shown on Figure RFI2.

As previously noted, the concrete production yard is located within a localised topographical closed depression formed by previous quarrying activity. As such, any surface water run-off from the concrete yard collecting at the two existing low points / sumps in the south-western corner of the concrete production yard cannot flow under gravity toward any external drainage channel or watercourse and must be pumped to the supply pond at a higher level.

At the time of the site inspection by the EPA in June 2010, it was observed that surface water run-off was ponding across the concrete production yard and that the ponded water extended to the disused shed which will house the proposed waste inspection and quarantine area. Surface water run-off was ponding across the concrete production area at that time because the pumps located at the low points / sumps in the south-western corner of the site had been disabled as concrete production at the yard had been temporarily suspended.

Concrete production at the yard has since resumed, the ponded water has been pumped to the supply pond and surface water run-off is pumped on a continuous basis to the supply pond as required.

2.6 Fuel and Oil Storage

At the present time, fuel for plant and vehicles is stored at two locations at the Fassaroe landholding. There is a bunded fuel tank within the existing maintenance shed at the immediately east of the existing site office. The shed is covered and has a concrete floor. The tank is bunded to 110% of the tank storage volume. At the present time, plant and equipment used across the Fassaroe site is generally refuelled at this location. This arrangement will continue for the foreseeable future.

There is a second refuelling point at the concrete production area on the western of the Fassaroe landholding. This tank is also bunded to 110% of the tank storage volume and is used predominantly to refuel concrete truck and haulage (HGV) lorries operated by Roadstone staff or hauliers contracted to it on a long term basis. This arrangement will also continue for the foreseeable future.

Details of contingency measures be implemented in the unlikely event of a fuel spill or leakage are provided in Appendix 2.2 in Chapter 2 of the Environmental Impact Statement which accompanied the original waste licence application.

3 PROPOSED WATER MANAGEMENT PLAN

3.1 Pollution Risk

Details of proposed water management measures to be implemented at the proposed soil recovery facility in order to minimise the risk of pollution to surface water and groundwater arising as a result of waste recovery activities, are presented in the Environmental Impact Statement which accompanied the waste licence application. These are further elaborated upon below, in response to specific queries raised by the Environmental Protection Agency in its Request for Further Information (RFI) letter dated 7th October 2010.

Notwithstanding the measures presented in the EIS and elaborated upon below, **it is emphasised** that the materials which will be imported and handled at the Fassaroe waste recovery facility will be inert and by definition therefore, devoid of contamination by Annex I and Annex II substances listed in Council Directive 80/68/EC.

3.2 Management of Rainwater Ponds

3.2.1 Re-use or Recirculation of Water in Silt Ponds (RFI Item1(i))

Backfilling of the worked out pit at Fassaroe will progress southwards from the northern end. Prior to backfilling the area around the northern silt pond (as sanctioned by the waste permit issued by Wicklow County Council in March 2009), all water within it was pumped and/or displaced to the lower lying (southern) silt pond. At the present time, the northern silt pond has been backfilled above its former surface level (approximately 75mOD) using imported inert soil and only minor volumes of ponded water remain across this area.

While the EIS had envisaged a possible need for construction of a temporary raised berm along the western and south-eastern boundaries of the southern silt pond, to increase its capacity to temporarily hold and store water pumped there from the northern silt pond, this was not ultimately required and will not now proceed.

Wet processing of sand has ceased at Fassaroe, and consequently, water in the northern and/or southern silt pond is no longer recycled or re-used.

3.2.2 Movement of Water from Silt Ponds to Supply Pond (RFI Item 1(ii))

At the present time, there is an extensive area of dry (ie. not submerged) ground across the central area of the former pit. It is envisaged that as this central area is being backfilled with imported soil over an extended period of time, water in the southern silt pond will be slowly and/or intermittently pumped across the Fassaroe landholding to the supply pond. Importation and placement of inert soil across the southern silt pond will proceed as water levels are lowered and ground is exposed in front of the proposed backfill area.

Tests undertaken to date on the quality of water in the silt ponds indicate that it is uncontaminated. In light of this and

(i) precautionary measures to be implemented to ensure that only inert soils are imported to the recovery facility at Fassaroe
(ii) contingency measures to be enacted in the unlikely event of a fuel spill (refer to Appendix 2.2 of Chapter 2 of the EIS accompanying the waste licence application)
(iii) the separation distance and relatively low permeability of the silt lying over the ground surface between the current backfilling area and the southern silt pond,

it is considered reasonable to assume that the existing water in the southern pond will remain uncontaminated and can therefore be transferred without treatment across the Fassaroe landholding to the supply pond. If necessary, further testing of water quality in the southern pond can be undertaken in advance of pumping to the supply pond to confirm this.

It should be recognised that, irrespective of any testing and/or treatment requirements, the transfer of water in the silt pond to the supply pond will, ***of itself***, provide an enhanced degree of environmental protection, over and above the do-nothing scenario which would see the existing water remain in-situ in the southern silt pond. This is because pumping water to

another pond further up-hydraulic gradient increases the vertical separation between the ponded water and the underlying groundwater table. In this instance there is 19m to 20m of unsaturated subsoil underneath the supply pond as against 5m to 7m at the southern silt pond.

Slow percolation of water through the floor of the southern pond may also contribute to further lowering of water levels. Meteorological factors will also influence the rate at which water levels will fall, with reduced summer rainfall and increased temperatures contributing to reduced recharge and limited evaporation.

Consideration will also be given to excavating sumps through the silt layer at the sides and/or base of the southern silt pond in order to enhance the rate of downward percolation / recharge through the unsaturated sand and gravel to the underlying groundwater aquifer. It is suspected however that the in-situ sand and gravels may be relatively silty and that this measure may not enhance the rate at which the water level in the southern silt pond can be lowered.

3.2.3 Management of Rainwater (RFI Item 1(iii))

At the present time, most rainwater falling at the application site percolates directly into the ground and through the underlying permeable, unsaturated sand and gravel deposit to the groundwater aquifer. Although it is possible that very minor quantities of infiltrated rainwater could flow laterally through the sand and gravel, there is little or no evidence of seepage (and any related instability) in the side walls of the worked out pit.

There is little or no surface water run-off across the open, unvegetated ground close to original ground level around the worked-out pit and into the existing silt ponds. In the unlikely event that any appreciable overground flows are identified on the higher ground around the worked out pit during backfilling operations, a collector channel will be dug where practicable and sensible to do so, to intercept and divert run-off away from the edge of the pit and the silt ponds. If such collector channels are constructed, they will divert run-off to an infiltration area constructed over permeable sand and gravel on open agricultural ground down gradient and east of the worked-out pit. As the collected run-off will run over inert materials and/or natural soils and subsoil, no treatment or monitoring of it is envisaged.

As backfilling of the northern area of the pit progressed during the autumn, winter and spring of 2009/2010, it was observed that much of the rainfall over the backfilled soil was absorbed into it and that volumes of run-off over the backfilled soil were relatively minor. In light of this experience, it is expected that the volume of surface water run-off likely to arise within the worked out pit during future backfilling operations will also be relatively minor.

During the infilling operations, the upper surface of the backfilled soil will be graded so as to ensure that such surface water run-off that does arise at the worked-out pit falls to sumps at temporary low points. These temporary sumps will effectively function as primary settlement ponds and water collecting in them will be pumped if necessary to another sump at an extreme low point at the southern silt pond. Water will then be pumped periodically from this extreme low point to the supply pond. At all times care will be taken to ensure that pumping causes minimum agitation to water collecting in sumps.

For the same reasons as outlined previously, it is considered reasonable to assume that run-off collecting at the sump at a low point at the southern silt pond will remain uncontaminated. It is therefore proposed to transfer collected surface water run-off within the worked out pit without treatment across the Fassaroe landholding to the supply pond. Again, if necessary, ongoing testing of water quality in the southern pond can be undertaken to confirm this.

At no time during the backfilling activities will surface water run-off be directed to watercourses around or beyond Roadstone Wood's property boundary.

3.2.4 Protection of Groundwater (RFI Item 1(iv))

As indicated previously, a significant proportion of surface water at Fassaroe ultimately recharges to groundwater. Preservation of groundwater quality at the proposed waste recovery facility will therefore necessitate careful management of surface water. Measures to protect surface water quality are outlined / referenced throughout this section of the water management plan.

Notwithstanding these measures**, it is again emphasised** that the materials which will be imported and handled at the Fassaroe waste recovery facility will be inert and by definition therefore, devoid of contamination by Annex I and Annex II substances listed in Council Directive 80/68/EC. Additional precautionary measures associated with the acceptance and handling of waste are detailed in the following sections of the EIS

- Section 2.4 (Waste Acceptance and Handling)
- Appendix 2.1 (Waste Handling and Acceptance Plan)
- Appendix 2.2 (Contingency Plan, Section 3, Spillage and Leakage Management Plan)

3.2.5 Prevention of Flooding (RFI Item 1(v))

As previously noted, the surface water observed across the concrete production yard in June 2010 arose because the pumps draining the yard had been disabled when concrete production was temporarily suspended. Roadstone Wood's staff at Fassaroe advise that there is no history of flooding at the site and have no memory or record of flooding and/or impeded drainage across the property.

Roadstone Wood is prepared to provide an undertaking that at all times when the waste licence facility is operational, the pumps at the concrete production yard will remain in operation and will maintain the concrete production yard and Waste Quarantine and Inspection Area free of ponded water on a continuous basis.

3.2.6 Use of Replacement Ponds (RFI Item 1(vi))

At the time the waste licence application was submitted, consideration was given to possible construction of modest scale temporary infiltration / intermediate settlement ponds on the undisturbed ground immediately south-east of the sand washing plant to provide for discharge of water from the southern silt pond to groundwater (refer to Figure RFI2).

On further consideration, it was felt that the relatively high permeability of the sand and gravel close to ground level could also result in some leakage of water from the proposed temporary infiltration / settlement ponds, through the ground and back into the worked out pit and southern silt pond (which lies down hydraulic gradient). This might also present some implications for stability of the side walls of the worked out pit and the sand stockpiled behind them.

For this reason, it is not now envisaged that any temporary infiltration / intermediate settlement ponds will be constructed to provide for discharge of water from the southern silt pond to groundwater or reduce concentration of suspended solids in pumped water. It is now envisaged that all water in the southern silt pond will be pumped directly to the supply pond.

3.3 Silt (Supply) Pond

3.3.1 Ultimate Destination of Water in the Supply Pond (RFI Item 2(i))

Details of the ultimate destination of water in the supply pond have previously been outlined and explained in Section 2.3 of this plan.

3.3.2 Assessment of Impacts on Groundwater in the Vicinity of the Supply Pond (RFI Item 2(ii))

An assessment of the likely impacts of site activities on groundwater in the vicinity of the supply pond has previously been presented in Section 2.4 of this plan.

3.3.3 Measures to Protect Water Quality in Supply Pond (RFI Item 2(iii))

As previously indicated, surface water run-off from the concrete production yard is currently discharged directly to the supply pond without undergoing any treatment to remove potential hydrocarbon contaminants. In order to preserve and enhance the water quality within the supply pond, it is proposed to

(i) divert (pump) surface water run-off which is currently collecting at the low point in front of the concrete batching plant to join with the run-off falling to the other low point in the extreme south-western corner of the concrete yard

(ii) ensure that all surface water run-off arising across the concrete yard is passed through a newly installed bypass separator prior to discharging to the sump in the extreme south-western corner of the site
(iii) pump the treated run-off from the sump to the supply pond
(iv) monitor the quality of the treated run-off at the downstream sump at regular / intermittent intervals in order to confirm it complies with relevant water quality standards (at monitoring location SW3 indicated in Figure RFI3).

A schematic layout of the proposed reconfigured surface water management system at the concrete yard is provided in Figure RFI3. A typical specification for a bypass separator (Klargester NSBP018 or similar) is provided in Appendix RFI1.

As previously explained, it is proposed to discharge water in silt ponds at the worked out quarry directly (ie. without any intermediate treatment) to the supply pond. In the event that the Agency considers that this proposal presents a unacceptable level of environmental risk to existing water quality in the supply pond, Roadstone Wood is prepared to accept a condition in its waste licence which

(i) requires water quality to be monitored and confirmed as being of an environmentally acceptable standard prior to being pumped to the supply pond OR
(ii) requires water to be routed through a separator if required to meet pre-defined water quality standards prior to being discharged at the water supply pond.

3.3.4 Requirement for Discharge to Surface Water (RFI Item 2(iv))

As previously noted, all surface water ponds within Roadstone Wood's landholding occur within closed depressions which are considered to be perched groundwater features. As the ponds lie within closed depressions, there is no overground drainage of water out of them.

Given

(i) the expected intermittent and/or extended duration for pumping water (several months) from the southern silt pond to the supply pond on the western side of Roadstone Wood's landholding
(ii) the relatively large storage capacity in the supply pond (the closed depression covers an area of approximately 3 hectares and has a minimum freeboard of 1.4m, giving a storage capacity of at least 42,000m^3)
(iii) the ongoing abstraction of water for concrete production purposes and
(iv) the discharge of water through the unsaturated, relatively permeable sand around the sides of the supply pond to the underlying groundwater table,

there will be no requirement to discharge water from the supply pond to the Cookstown River.

Calculations indicate that approximately 15,875m^3 of water will be pumped to the supply pond from the southern silt pond. The maximum volume of surface water run-off arising at the concrete yard from an extreme storm event with a return period of 100 years (100mm rainfall over 2 day period) is approximately 900m^3. The combined volume of 16,775m^3 (not allowing for any recycling of water for concrete production or loss through permeable strata around the sides) is significantly less than the additional storage capacity of at least 42,000m^3 available within the supply pond.

Notwithstanding this, it is proposed to monitor water levels at the supply pond on an ongoing basis and to ensure that there is sufficient storage within it at all times to safely accommodate any run-off from the concrete yard in the event of a 100 year extreme rainfall event.

FIGURES

LEGEND

Applicants Land Interest (c. 65.1 ha)

Waste Licence Application Area (c. 21.4 ha)

NOTES

1. Extract from Ordnance Survey Discovery Map No. 50

2. Ordnance Survey Ireland Licence No. SU 0000709 (c) Ordnance Survey Ireland / Government of Ireland

0 500 1000 1500 2000m 3000 4000 5000

Metres

1:50,000

0059.00017.18.FIG RFI 1.0.SITE LOC PLAN

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ROADSTONE DUBLIN LTD.
WASTE LICENCE APPLICATION

FASSAROE WASTE RECOVERY FACILITY
FASSAROE, BRAY, CO.WICKLOW

SITE LOCATION MAP

FIGURE RFI 1

Scale	Date
1:50,000	OCTOBER 2010

N
W
E
S

CONSTRUCTION & DEMOLITION WASTE RECYCLING AREA (HARDSTANDING)

NORTHERN SILT POND
(NOW BACKFILLED ABOVE FORMER LEVEL)

SW1

BH02

DISUSED ABSTRACTION PUMP

AGGREGATE WASHING PLANT

EXISTING COVERED SHED

CONCRETE YARD

FUEL STORAGE & TRUCK RE-FUELLING AREA

SUMP
(AT LOW POINT)

AVERAGE GROUND LEVEL 85.0mOD

PUMPHOUSE

TO CONCRETE PRODUCTION PLANT

BLOCK YARD

BH03

CENTRAL AREA
(SILT LAYER OVER PIT FLOOR)

SAND STOCKPILES

DISCHARGE PIPES

HOLDING TANK

STORAGE YARD

WEIGHBRIDGE

TO AGGREGATE WASHING PLANT

WATER LEVEL 75.0mOD

SOUTHERN SILT POND

WATER LEVEL 90.6mOD

RETAIL AREA & EMPLOYEE PARKING

EXISTING SITE OFFICE

ABSTRACTION PUMP
(FOR CONCRETE PRODUCTION & AGGREGATE PROCESSING)

MAINTENANCE SHED
(RE-FUELLING OF PLANT & EQUIPMENT)

BH01

SUPPLY POND

0 80m 200
Metres
1:2500

0059.00017.18.FIG RFI 2.0.EXISTING SURFACE WATER MANAGEMENT ARRANGEMENTS

NOTES

1. Ordnance Survey Ireland Licence no. SU 0000710 (c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

- Applicant's Land Interest (c. 65.1 ha)
- Waste Licence Application Area (c. 21.4 ha)
- Groundwater Monitoring Location
- SW1 — Surface Water Monitoring Location
- Flow Direction of Water Run-off

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WASTE LICENCE APPLICATION

FASSAROE WASTE RECOVERY FACILITY
FASSAROE, BRAY, CO.WICKLOW

EXISTING SURFACE WATER MANAGEMENT ARRANGEMENTS

FIGURE RFI 2

Scale: 1:2,500

Date: OCTOBER 2010

CONCRETE YARD

EXISTING COVERED SHED

UPSTREAM INTAKE SUMP

BYPASS SEPARATOR

LOW RISE WALL TO DIVERT SURFACE WATER RUN-OFF AWAY FROM SUMP

FUEL STORAGE & TRUCK RE-FUELLING AREA

SUMP (AT LOW POINT) (LOCALLY DEEPENED AS REQUIRED)

MONITORING POINT SW3

AVERAGE GROUND LEVEL 85.0mOD

COLLECTED SW RUN-OFF DIVERTED TO INTAKE POND UPGRADIENT OF INTERCEPTOR

PUMPHOUSE

TO CONCRETE PRODUCTION PLANT

HOLDING TANK

DISCHARGE PIPE

TO AGGREGATE WASHING PLANT

ABSTRACTION PUMP (FOR CONCRETE PRODUCTION & AGGREGATE PROCESSING)

WATER LEVEL 90.6mOD

0 10 20 30 40m 60 80 100

Metres
1:1000

0059.00017.18.FIG RFI 3.0.PROPOSED SURFACE WATER MANAGEMENT ARRANGEMENTS

N
W E
S

NOTES

1. Ordnance Survey Ireland Licence no. SU 0000710 (c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

- Applicant's Land Interest (c. 65.1 ha)
- Waste Licence Application Area (c. 21.4 ha)
- Groundwater Monitoring Location
- SW3 — Surface Water Monitoring Location
- Flow Direction of Water Run-off

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WASTE LICENCE APPLICATION

FASSAROE WASTE RECOVERY FACILITY
FASSAROE, BRAY, CO.WICKLOW

PROPOSED SURFACE WATER MANAGEMENT ARRANGEMENTS

FIGURE RFI 3

Scale	Date
1:1,000	OCTOBER 2010

APPENDIX RFI1

TYPICAL SPECIFICATION FOR BYPASS INTERCEPTOR

ADVANCED ROTOMOULDED CONSTRUCTION ON SELECTED MODELS!

Klargester Separators

A Range of Fuel/Oil Separators for Peace of Mind

Sustainable, Reliable, Affordable

Kingspan®

Introduction

Surface water drains normally discharge to a watercourse or indirectly into underground waters (groundwater) via a soakaway. Contamination of surface water by oil, chemicals or suspended solids can cause these discharges to have a serious impact on the receiving water.

The Environment Regulators, Environment Agency, England and Wales, SEPA, Scottish Environmental Protection Agency in Scotland and Department of Environment & Heritage in Northern Ireland, have published guidance on surface water disposal, which offers a range of means of dealing with pollution both at source and at the point of discharge from site (so called 'end of pipe' treatment). These techniques are known as 'Sustainable Drainage Systems' (SuDS).

Where run-off is draining from relatively low risk areas such as car-parks and non-operational areas, a source control approach, such as permeable surfaces or infiltration trenches, may offer a suitable means of treatment, removing the need for a separator.

Oil separators are installed on surface water drainage systems to protect receiving waters from pollution by oil, which may be present due to minor leaks from vehicles and plant, from accidental spillage.

Effluent from industrial processes and vehicle washing should normally be discharged to the foul sewer (subject to the approval of the sewerage undertaker) for further treatment at a municipal treatment works.

Separator Standards and Types

A British (and European) standard (BS EN 858-1 and 858-2) for the design and use of prefabricated oil separators has been adopted. New prefabricated separators should comply with the standard.

Separator Classes

The standard refers to two 'classes' of separator, based on performance under standard test conditions.

Class I

Designed to achieve a concentration of less than 5mg/l of oil under standard test conditions, should be used when the separator is required to remove very small oil droplets.

Class II

Designed to achieve a concentration of less than 100mg/l oil under standard test conditions and are suitable for dealing with discharges where a lower quality requirement applies (for example where the effluent passes to foul sewer).

Both classes can be produced as full retention or bypass separators. The oil concentration limits of 5 mg/l and 100 mg/l are only applicable under standard test conditions. It should not be expected that separators will comply with these limits when operating under field conditions.

Full Retention Separators

Full retention separators treat the full flow that can be delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr. On large sites, some short term flooding may be an acceptable means of limiting the flow rate and hence the size of full retention systems.

Bypass Separators

Bypass separators fully treat all flows generated by rainfall rates of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

Forecourt Separators

Forecourt separators are full retention separators specified to retain on site the maximum spillage likely to occur on a petrol filling station. They are required for both safety and environmental reasons and will treat spillages occurring during vehicle refuelling and road tanker delivery. The size of the separator is increased in order to retain the possible loss of the contents of one compartment of a road tanker, which may be up to 7,600 litres.

Selecting the Right Separator

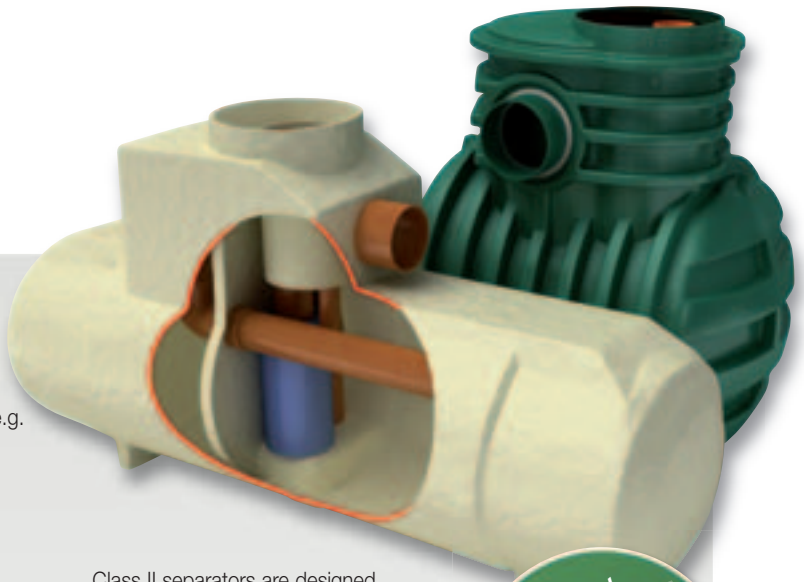
The chart on the following page gives guidance to aid selection of the appropriate type of fuel/oil separator for use in surface water drainage systems which discharge into rivers and soakaways.

For further detailed information, please consult the Environment Agency Pollution Prevention Guideline 03 (PPG 3) 'Use and design of oil separators in surface water drainage systems' available from their website.

Klargester Environmental has a specialist team who provide technical assistance in selecting the appropriate separator for your application.

Bypass Separator

NSBP Range



Application

Bypass separators are used when it is considered an acceptable risk not to provide full treatment, for very high flows, and are used, for example, where the risk of a large spillage and heavy rainfall occurring at the same time is small, e.g.

- Surface car parks.
- Roadways.
- Lightly contaminated commercial areas.

Performance

Klargester Environmental were one of the first UK manufacturers to have separators tested to EN 858-1 and have now added the NSBP bypass range to their portfolio of certified and tested models. The NSBP number denotes the maximum flow at which the separator treats liquids. The British Standards Institute (BSI) tested the required range of Klargester full retention separators and certified their performance in relation to their flow and process performance assessing the effluent qualities to the requirements of BS EN 858-1. Klargester bypass separator designs follow the parameters determined during the testing of the required range of bypass separators.

Each bypass separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Oil storage volume.
- Silt storage capacity.
- Coalescer.

The unit is designed to treat 10% of peak flow. The calculated drainage areas served by each separator are indicated according to the formula given by PPG3 NSB = 0.0018A(m^2). Flows generated by higher rainfall rates will pass through part of the separator and bypass the main separation chamber.

Class I separators are designed to achieve a concentration of 5mg/litre of oil under standard test conditions.

Class II separators are designed to achieve a concentration of 100mg/litre of oil under standard test conditions.

Advanced rotomoulded construction on selected models
- Compact and robust
- Require less backfill
- Tough, lightweight and easy to handle

Features

- Light and easy to install.
- Class I and Class II designs.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Oil alarm system available (required by BS EN 858-1 and PPG3).
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size bypass separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the flow is not pumped .
- The required discharge standard. This will decide whether a Class I or Class II unit is required.
- The drain invert inlet depth.
- Pipework type, size and orientation.

Sizes & Specifications:

Unit Nominal Size	Flow (l/s)	Peak Flow Rate (l/s)	Drainage Area (m^2)	Storage Capacity (litres) Silt	Oil	Unit Length (mm)	Unit Dia. (mm)	Access Shaft Diameter (mm)	Base to Inlet Invert (mm)	Base to Outlet Invert (mm)	Standard Fall Across Unit	Min. Inlet Invert (mm)	Standard Pipework Diameter (mm)
NSBP003	3	30	1670	300	45	1700	1350	600	1420	1320	100	500	315
NSBP004	4.5	45	2500	450	68	1700	1350	600	1420	1320	100	500	315
NSBP006	6	60	3335	600	90	1700	1350	600	1420	1320	100	500	315
NSBP008	8	80	4445	800	120	3065	1225	750	1450	1350	100	500	315
NSBP010	10	100	5560	1000	150	3065	1225	750	1450	1350	100	500	315
NSBP012	12	120	6670	1200	180	3915	1225	750	1450	1350	100	500	315
NSBP015	15	150	8335	1500	225	3915	1225	750	1450	1350	100	500	315
NSBP018	18	180	10000	1800	270	3200	2012	600	2110	2010	100	1000	375
NSBP024	24	240	13340	2400	360	3200	2012	600	2110	2010	100	1000	375
NSBP030	30	300	16670	3000	450	3915	2012	600	2110	2010	100	1000	450
NSBP036	36	360	20000	3600	540	3915	2012	600	2110	2010	100	1000	525
NSBP055	55	550	30560	5500	825	5085	2820	600	2310	2060	250	1000	750
NSBP072	72	720	40000	7200	1080	5820	2820	600	2310	2060	250	1500	750
NSBP084	84	840	46670	8400	1260	6200	2820	600	2310	2010	300	1500	750
NSBP096	96	960	53340	9600	1440	7375	2820	600	2310	2010	300	1500	825
NSBP110	110	1100	61110	11000	1650	7925	2820	600	2360	2010	350	1500	825
NSBP130	130	1300	72225	13000	1950	8725	2820	600	2360	2010	350	1500	825

Rotomoulded chamber construction *GRP chamber construction*

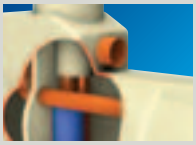
Kingspan Environmental Solutions

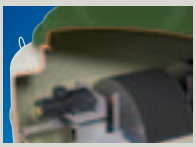

Commercial Sewage Treatment Plants


Large Capacity Pumping Stations

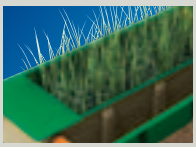

Stormwater Attenuation Systems


Residential & Commercial Rainwater Harvesting

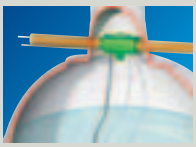

Oil/Water Separators


Domestic Sewage Treatment Plants


Packaged Pump Systems

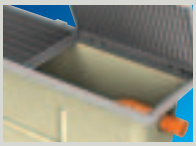

Reed Beds

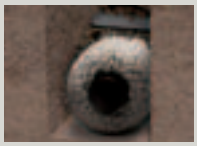

Domestic Rainwater Harvesting


Garden Watering Systems


Septic Tanks


Below Ground Storage Tanks


Grease & Silt Traps


Packaged Drainage Systems

Other Applications

As specialists in wastewater we are able to provide solutions for many different applications. Please contact us for further information.

D.E.T.A.
Domestic Effluent Treatment Association

BRITISH WATER

UK GREEN BUILDING COUNCIL
Founding Member

Kingspan Environmental Service

Who better to look after your wastewater product than the people who designed and built it?

Kingspan Environmental have a dedicated service division providing maintenance for wastewater and rainwater products.

Kingspan
Environmental : Service

Factory trained engineers are available for site visits as part of a planned maintenance contract or on a one-off call out basis.

To find out more about protecting your investment and ensuring peace of mind, contact us on **(NI) 028 302 54077, (IRL) 048 302 54077** or visit us online at **www.kingspanenvservice.com**

Issue No. 6: October 2009

Kingspan

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Klargester is part of Kingspan Environmental.

SECTION 2 : DESCRIPTION OF WASTE RECOVERY FACILITY

2.1 PRINCIPAL ELEMENTS

The proposed waste recovery facility at Fassaroe, Bray Co. Wicklow provides for

(i) Use of imported inert natural materials, principally excess soil, stones and/or broken rock excavated on construction sites, to backfill and restore a large existing void created by previous extraction of sand and gravel
(ii) Recovery of imported inert construction materials, including stones, granular fill, concrete, blocks, bricks and ceramic tile, using crushing and screening equipment to generate secondary (recycled) aggregate
(iii) Separation of any non-inert construction and demolition waste (principally metal, timber, PVC pipes and plastic) unintentionally imported to site prior to removal off-site to appropriately licensed waste disposal or recovery facilities
(iv) Use of secondary aggregate to construct internal haul roads within and across the application site
(v) Sale and export of secondary aggregate off-site for re-use by others
(vi) Phased restoration of the backfilled void (including placement of cover soils and seeding) and return to use as agricultural grassland
(vii) Temporary stockpiling of topsoil and subsoil pending re-use as cover material for phased restoration of the site
(viii) Environmental monitoring of noise, dust, surface water and groundwater for the duration of the site restoration works.

The existing void will only be infilled using inert materials imported from pre-approved external construction sites and secondary aggregate generated on site. No peat, contaminated soils intermixed construction and demolition waste or non-hazardous waste will be accepted at the proposed waste recovery facility. Any non-inert construction and demolition waste will be removed off-site. The location and existing layout of the application site indicated on Figure 2.1.

2.2 SITE INFRASTRUCTURE

2.2.1 Site Security

Vehicular access into Roadstone Dublin's landholding and the application site can only be gained via an existing private access road, approximately 930m long, known as Fassaroe Avenue. Aside from this road, there is no other vehicular access to the landholding. At the present time, the entire site boundary is closed off by post and wire fencing and/or hedgerow. Prior to commencement of backfilling and restoration activities, a survey of the entire property boundary will be undertaken and where necessary, existing fences will be repaired and/or replaced and hedgerows will be strengthened or fortified by additional planting.

The only vehicles which will be permitted to access the proposed waste recovery facility will be HGV's carrying inert soil for backfilling and restoration purposes or construction and demolition waste for recovery. The recent planning permission in respect of the proposed backfilling of the quarry void issued by Wicklow County Council provides for up to 200 additional HGV truck movements along Fassaroe Avenue each day (100 in and 100 out of the proposed facility). Planning permission for C&D waste recovery activities was previously granted in 2004.

Inert materials are accepted at the site between 08.00hours and 18.00hours each weekday (Monday to Friday) and 08.00hours to 13.00hours on Saturday. No materials are accepted at any other time including Sundays and Public Holidays. At all other times, the front gates at the access road will be closed, thereby restricting entry.

All heavy good vehicles (HGVs) importing construction and demolition waste or soil and stone to the proposed waste recovery facility are required to pass over the existing weighbridge at the front of the Fassaroe site. Thereafter, they run over the existing network of internal haul roads toward the existing / proposed waste recovery facility.

On arrival at the Fassaroe site, HGV drivers will identify themselves to the weighbridge clerk before proceeding to the C&D waste recovery facility. The weighbridge clerk shall take a copy of

the weigh docket, record the time and date of arrival, the nature and origin of the imported waste, the Client, the truck licence plate number and relevant collection permit details.

2.2.2 Site Roads and Parking Areas

All trucks delivering inert waste to the proposed waste recovery facility will be confined within the Applicant's landholding. Trucks will initially travel over a paved road surface leading to the existing weighbridge inside the site entrance. Thereafter they will travel over a network of paved and unpaved internal roads to get to the waste recovery facility and the active restoration or recycling areas. The extent of paved and unpaved haul roads across the application site is indicated on the proposed site layout in Figure 2.2. It is envisaged that the existing paved internal road leading to the block yard will be extended northwards in the direction of the waste recovery facility, past the proposed location of the new wheelwash facility.

Provision for employee and visitor car parking is currently provided on a paved area adjacent to the existing site office, immediately inside the site entrance.

2.2.3 Hardstanding Areas

A temporary hardstanding area constructed of secondary aggregate is provided at the existing construction and demolition (C&D) waste recovery facility for

(i) stockpiling and recovery of inert C&D waste imported to site;
(ii) separation and storage (in skips) of any separated non-inert C&D wastes inadvertently mixed with it (most likely to comprise metal, timber, PVC pipes, plastic etc) and
(iii) storage of plant, equipment and materials.

At the present time, the hardstanding area is not sealed and any rain falling over this area either percolates downwards into the underlying soils or runs-off eastwards over the existing ground surface, toward the existing quarry void.

2.2.4 Wheelwash and Weighbridge

In order to prevent transport of soil across internal haul roads and onto public roads, it is envisaged that a temporary wheelwash facility will be installed along the access route to the waste facility, as shown on the site infrastructure layout in Figure 2.2. All site traffic exiting the waste recovery facility will be directed through this wheelwash.

In order to track and record the amount of material entering the application site, all HGV drivers importing soil and stones or C&D waste to the waste recovery facility will be required to present and identify themselves at the existing weighbridge inside the front gate of the Fassaroe site. Any secondary aggregate exported off-site and any non-inert construction and demolition waste dispatched to other licensed waste disposal or recovery facilities will also be directed to and weighed at the existing weighbridge. Records of tonnages of imported waste and exported secondary aggregate will be maintained for waste auditing purposes.

2.2.5 Laboratory Testing

Laboratory testing of soil, surface water, groundwater and leachate will be undertaken off-site at an ILAB / UKAS accredited geo-environmental laboratory. Any validation testing and laboratory testing required to confirm classification of waste as inert will also be undertaken by the same laboratory. All samples taken on-site will be forwarded to the laboratory on the same day and test results will typically be forwarded to site within seven to ten working days.

It is not envisaged that any environmental monitoring equipment such as pH and temperature meters, conductivity meters, flow meters and dissolved oxygen meters will be stored at the site office for the duration of the restoration works. Any such equipment will be brought to site by an in-house and/or independent environmental consultant as and when required.

2.2.6 Fuel and Oil Storage

It is not intended to provide dedicated bunded fuel storage tanks for the waste recovery facility. Fuel for plant and equipment working at the facility will be stored in existing fuel tanks within the

Fassaroe complex. These tanks are constructed on a sealed concrete surface and are bunded to 110% of tank storage volume.

Plant maintained on site will principally comprise mechanical excavators and/or bulldozers, mobile crushing and screening plant. Mobile plant and equipment undertaking site restoration work and/or C&D waste recovery will be refuelled from mobile, double skin fuel bowsers or at maintenance sheds within the Fassaroe complex. Oil and lubricant changes and servicing of wheeled or tracked plant will be undertaken at the existing maintenance shed. Re-fuelling of HGV trucks will take place on site at the auto-diesel tanks adjacent to the existing concrete production facility (Refer to Figure 2.2).

A small bunded tank for waste oils is currently provided at the maintenance shed and is emptied at intervals by a licensed waste contractor and disposed off-site at a suitably licensed waste facility.

2.2.7 Waste Inspection and Quarantine Facility

Any imported waste which, it is suspected, may not comply with waste acceptance criteria for the waste recovery facility, will be transferred across the application site to a covered shed which is currently unused and located adjacent to the concrete production facility (refer to Figure 2.2). This shed is a portal frame structure and is constructed over a sealed concrete slab. It will serve as the dedicated waste inspection and quarantine facility for the waste recovery operation.

As incipient rainfall will not come into contact with consignments of suspected contaminated waste stored at the covered shed, there is no requirement to install drainage infrastructure to provide for collection and storage of potentially contaminated surface water run-off.

Visual inspection, in-situ monitoring and testing of imported waste materials will be undertaken by the Applicant's site staff as inert waste materials are end-tipped at the active restoration area. Should there be any concern about the nature of the soil materials being end-tipped it will be re-loaded onto the truck and re-directed to the waste inspection and quarantine facility for closer examination and inspection. Detailed records of all such inspections will be kept.

Should inspection or testing of suspect soil waste at the inspection and quarantine facility identify any non-inert material which cannot be accepted and used for restoration of this site, it will be segregated and temporarily stockpiled (quarantined) pending removal off-site by permitted waste collectors to a suitably licensed permitted waste disposal or recovery facility. Provision will also be made for temporary storage of any separated non-inert construction and demolition waste (including metal, timber, plastic etc.) at the waste inspection area prior to removal off-site to a licensed recovery facility.

The concrete production yard in which the proposed waste inspection and quarantine facility is located lies within a closed depression and is drained on a continuous basis by sumps / pumps in the south-western corner. In order to maintain the Waste Quarantine and Inspection Area free of ponded water at all times, the pumps will remain in continuous operation for as long as the waste licence facility remains operational (even if the adjoining concrete production facilities should be temporarily suspended or shut down for maintenance).

2.2.8 Traffic Control

All traffic to and from the proposed waste facility will travel to and from the Fassaroe Junction on the N11 National Primary Road. Traffic from the N11 will run for a short distance (approximately 600m) over the local road network, travelling initially westwards and then turning south on a public road (Kilbride Road) until it comes to a small roundabout junction with Fassaroe Avenue, a private road, approximately 930m long, leading to the entrance to Roadstone Dublin's landholding.

Internally, within Roadstone Dublin's landholding, warning notices, direction signs and speed restriction signs are established along paved and/or unpaved roads leading to and from the waste facility, the active restoration area and the construction and demolition waste recycling area.

All HGV traffic egressing the application site will be required to pass through the temporary wheelwash facility and the existing weighbridge inside the front gates, shown on Figure 2.2.

2.2.9 Sewerage and Surface Water Drainage Infrastructure

At the present time, site staff at the Fassaroe complex use toilet, hand washing and welfare facilities provided at existing site offices and production facilities. It is envisaged that existing staff welfare facilities will also be used by staff employed at the waste facility. The locations of septic tanks servicing these facilities are shown on the site services drawing in Figure 2.3.

A significant proportion of rainfall and/or surface water at the Fassaroe site ultimately recharges to groundwater. Preservation of groundwater quality at the proposed waste recovery facility therefore necessitates careful management of surface water. Currently, rainfall across the application site either percolates downwards through the unsealed ground to the underlying groundwater aquifer or runs over the ground surface to the two existing surface ponds in the bottom of the worked out quarry (designated northern and southern ponds, refer to Figure 2.1). Surface water collecting in the northern pond is re-used / re-circulated and used for aggregate processing (washing) at the adjacent facility.

*Lowering of Water Level in Northern **and Southern Ponds***
Available survey data suggests that the depth of water in the existing surface water pond at the bottom of the proposed infill area varies from 0m to in excess of 5m deep. As backfilling of the former quarry will progress southwards from the northern end, a number of measures are to be adopted in order to effect a lowering of the water level in the northern pond area prior to the importation and placement of inert fill materials. These include

(i) minimisation of additional recharge by rainfall by constructing drainage channels around the edge of the pond to collect and divert overground surface water flows **to infiltration areas to eth east of the pond and/or to** the southern pond;
(ii) construction of a temporary raised berm along the western and south-eastern boundaries of the southern pond (if necessary) in order to increase the capacity of water which may be pumped there from the northern pond and retained on a short term basis (pending re-use in aggregate production and/or percolation though the floor and sides to the underlying groundwater table) and
(iii) **slow and/or intermittent** pumping of untreated water **from the southern pond as the central area of the worked out pit is backfilled**, across the Applicant's landholding, to the much larger surface water pond **(known as the 'supply pond')** to the south of the concrete batching plant, indicated on Figure 2.1. **If necessary, testing of water quality will be undertaken in advance of pumping to confirm it complies with specified surface water quality standards.**

Consideration will also be given to excavating sumps through the silt layer at the sides/or base of the existing **ponds** in order to enhance the rate of downward percolation / recharge through the unsaturated sand and gravel to the underlying aquifer. It is suspected however that the in-situ sand and gravels may be relatively silty and that this measure may not enhance the rate at which the water level in the **ponds** can be lowered.

Pumping from the existing surface water **ponds** will be undertaken over an extended period of time, the intention being to gradually reduce the pond footprint and the area of ground under water in front of the proposed backfill area. Importation and placement of inert materials will proceed according as water levels in the **ponds** are lowered and an increased area of ground is exposed in front of the proposed backfill area.

In addition to these measures, slow percolation of water through the floor of the **ponds** is expected to contribute to further lowering of the water level in the **ponds**. Meteorological factors will also influence the rate at which water levels will fall, with reduced summer rainfall and increased temperatures contributing to reduced recharge and increased evaporation respectively.

Surface Water Management at Waste Inspection and Quarantine Facility
As previously outlined, any suspect contaminated waste imported to this facility will be transferred across the application site to a covered shed located adjacent to the concrete production facility. 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 separate

drainage infrastructure to provide for collection and storage of potentially contaminated surface water run-off at the waste inspection and quarantine facility.

At the present time, surface water run-off from the concrete production yard is discharged directly to the surface water pond which lies immediately south and upslope of it (the 'supply pond') without undergoing any treatment. In order to preserve and enhance the water quality within the supply pond, it is proposed to

(i) divert (pump) surface water run-off which is currently collecting at the low point in front of the concrete batching plant and divert it to join with the run-off falling to the other low point in the extreme south-western corner of the concrete yard
(ii) ensure that all surface water run-off arising across the concrete yard is passed through a bypass separator prior to discharging to a sump in the extreme south-western corner of the site
(iii) pump the treated run-off from the sump to the supply pond
(iv) monitor the quality of the treated run-off at regular / intermittent intervals in order to confirm it complies with relevant water quality standards.

A schematic layout of the proposed reconfigured surface water management system at the concrete yard is provided in Figure 2.2a.

Surface Water Management during Quarry Backfilling
As backfilling **of the central area of the** former quarry proceeds over the short-to-medium term, surface water will continue to be diverted via collector drains **toward** the southern pond or will percolate through the ground to the underlying aquifer. Water collecting in the southern pond will continue to be re-circulated for aggregate processing (washing) at the adjacent plant **(if required)** or will itself discharge through the underlying unsaturated soils to the underlying groundwater aquifer.

Should there be any marked rise in water levels within the southern pond at any stage, excess water will be pumped across the Applicant's landholding to the much larger surface water pond to the south of the concrete batching plant **('the supply pond')** as necessary.

As backfilling and restoration of the former quarry proceeds to its final phase **at the southern pond**, it is envisaged that surface water in the southern pond **and/or** process water from the **sand processing plant** will either be

(i) pumped / re-circulated to and from the much larger surface water pond to the south of the concrete batching plant (**the 'supply pond'**) or
(ii) pumped / re-circulated to and from more modest scale replacement settlement ponds located on undisturbed ground immediately **south-east** of the existing sand washing plant.

During and after the final phase of backfilling, ground contours and/or drainage channels will be modified as necessary to ensure that surface water run-off **across this area** is re-directed to sumps for pumping to the larger surface water pond or the replacement settlement ponds.

At no time during the restoration works or the operation of the construction and demolition waste recovery facility will surface water run-off be directed to watercourses or ponds beyond the site boundary.

Further detail on management of surface water at the waste licence application site is provided in a Water Management Plan (dated October 2010) reproduced in Appendix 2.3 of this EIS.

2.2.10 Site Services

Electric power, lighting and heating are all currently provided via the electricity network to the existing site offices at the Fassaroe complex. Permanent telephone (landline), fax and e-mail facilities will all be available at the existing site office. Site staff overseeing backfilling and recovery operations at the application site will be contactable by mobile phone.

Given the lack of combustible waste materials at this site, it is considered highly unlikely that a fire will break out during backfilling and recovery operations. Fire extinguishers will be kept at the site office to deal with any localised small scale fires which might occur.

The Dublin City Council watermain carrying drinking water from the Roundwood reservoir to the city runs through the middle of the application site, as shown in Figure 2.3. Apart from internal water supply and wastewater pipework and a short section of buried electrical cable west of the block yard, no other buried services are understood to occur across the application site. Several overhead electricity transmission cables criss-cross the application site and these are also shown on Figure 2.3.

2.2.11 Plant Sheds and Equipment Compounds

Plant and equipment used in the backfilling and/or recovery activities will be stored on the temporary hardstanding area at the application site and/or at the existing plant maintenance sheds. Given the restricted access into the Fassaroe site, it is not considered necessary to provide a secure compound at the waste recovery facility.

No dedicated workshops will be provided at the waste recovery facility. Any plant or equipment requiring specialist repair or overhaul will be taken to the existing maintenance sheds at the front of the site.

2.2.12 Site Accommodation

At the present time, there is a fully serviced permanent site office located at the entrance to the Fassaroe site. This office will be used for all administration and management functions for the waste recovery facility. Staff changing, washing and cooking facilities will be provided at existing staff facilities at the Fassaroe site.

2.2.13 C&D Waste Recovery Infrastructure

Inert construction and demolition waste imported to site will be recycled at the existing hardstanding area, shown in Figure 2.2. Any metal waste will be separated and placed in a skip pending removal off site to a licensed recovery facility. Any other non-inert waste (timber, plastic etc.) will also be separated off and placed in a skip pending removal off-site by permitted waste collectors to a licensed disposal or recovery facility.

Construction and demolition waste will be recycled by passing it through a mobile crushing plant which will be brought to the facility periodically, once sufficient quantity of recycleable material has accumulated. The crushing plant will produce a particulate, granular fill which may be used to construct hardstanding areas or temporary haul roads.

2.3 RESTORATION AND RECOVERY ACTIVITIES

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

2.3.1 Backfilling / Restoration Schedule

Backfilling of the application site will proceed in several phases and on completion, will merge into the surrounding undulating pastoral landscape. An outline of the proposed phasing and the final ground level contours are shown in Figure 2.4. In addition to imported materials, soil in existing screening berms and/or stockpiles within the application area will also be used to backfill the former quarry. Cross-sections through the final landform are shown in Figure 2.5.

It is currently envisaged that backfilling of the existing void will proceed from the northern to the southern end of the quarry. Any temporary additional or replacement infrastructure required to facilitate the proposed works will be constructed and/or installed at the outset of the first phase of backfilling.

The ground profile on completion of the first phase of backfilling is shown in Figure 2.6. Thereafter, backfilling of the quarry will progress continuously southwards, through Phases 2,3 and 4, as indicated on the phasing drawings in Figures 2.7 to 2.10.

On completion of each restoration phase, a cover layer of subsoil and topsoil will be placed and graded across the backfilled soil. This will then be planted with grass in order to promote stability and minimise soil erosion and dust generation.

2.3.2 Method and Safety Statements for Construction Works

Any additional infrastructure required at the application site, over and above that which is currently in place will be constructed in accordance with a detailed construction method statement and health and safety plan prepared by external works Contractors. In preparing such plans, regard will be had to safety risks and potential conflicts presented by ongoing aggregate processing, concrete production and C&D waste recovery activities.

2.3.3 Material Requirements

The only material requirements in respect of the proposed restoration scheme are the inert soil, stone and rock used in backfilling the existing void. Clean, inert soil and stone is likely to be sourced from greenfield development sites. Intermixed soil, stones and inert construction waste (concrete, block and brick) will be sourced from re-development sites or from utilities excavations in urban areas.

The total void space to be backfilled and restored is approximately 375,000m^3. As the application site is zoned for development in the future, the backfilled materials will be subject to significant compactive effort in order to densify them and reduce the potential for long-term settlement. A target compaction density of 2.0t/m^3 is therefore assumed for tonnage assessment purposes, indicating that approximately 750,000 tonnes of inert soil and/or subsoil will be required to backfill the existing quarry void.

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

MATERIAL	QUANTITY	SOURCE
Inert subsoil, stones and rock	610,000 tonnes	Imported
Stockpiled soil	130,000 tonnes	In-situ
Topsoil (150mm)	10,000 tonnes	Imported

Table 2.1 Material Requirements

In addition to the above, a relatively small quantity of secondary aggregate produced on site will be required to construct temporary haul roads across and through the site as the backfilling works proceed.

2.3.4 Materials Balance

Approximately 65,000m^3 (130,000tonnes) of the inert materials required to backfill the quarry site will be sourced from soil stockpiles and screening berms around the existing quarry void. All remaining inert materials to be used in the restoration of the application site will be imported from external development or construction and demolition work sites

2.3.5 Stability Analyses

The available site investigation data indicates that the area to be backfilled is underlain by a layer of uncompact fine sandy silt over competent silty sand and gravel strata. A gradual increase in loading will be applied to these soils according as backfilling progresses, at a rate which is not expected to result in a build up of excess porewater pressure or to induce undrained failure. Notwithstanding this, groundwater pressures within the sandy silt will be monitored as backfilling progresses to confirm that there is no build up of excess pore pressure within this layer.

It is expected that the application of loading to the underlying in-situ soils will not exceed that which existed prior to extraction of sand and gravel and no deep seated failure of temporary slopes is therefore anticipated.

Temporary side slopes in backfilled soils (above formation level) will be graded at an angle no steeper than 35° (approximately 1v:1.5h), sufficient to ensure no instability arises. It is envisaged that ongoing assessment of slope stability will be undertaken as backfilling progesses across the application site. In the longer-term, once site resortoration is complete, there will be no risk of instability as the site will be graded to a relatively flat, shallow slope.

2.3.6 Importation of Construction Materials

Any construction materials required to construct site infrastructure, principally drainage stone and concrete will be sourced from the adjacent concrete plant or aggregate processing facility. It is expected that the requirement for low grade granular fill for hardcore and/or hardstanding areas can be sourced on-site from the existing construction and demolition waste facility.

2.3.7 Removal of Materials Off-Site

Any non-hazardous or hazardous wastes identified within the soil imported for quarry restoration purposes will be transferred off-site by permitted waste collectors to suitably licensed waste disposal or recovery facilities. The Applicant anticipates, on the basis of its experience operating this and other waste recovery facilities to date, that these waste quantities will be very low.

Inert C&D waste recovered on site which is not re-used for internal haul road construction, will be supplied as low grade hardcore to construction companies in the Wicklow and Greater Dublin area. Any non-inert materials within the imported C&D waste (principally scrap metal, plastic and timber) will be removed off-site by permitted waste collectors to appropriately licensed recovery or disposal facilities.

2.3.8 Formation Levels and Gradients

The quarry void has been sub-divided into four separate phases to facilitate progressive restoration and reinstatement of the site to grassland, as indicated on Figures 2.7 to 2.10.

Formation levels for backfilling across the application site are taken to be equivalent to existing ground levels, as indicated on Figure 2.1. During each restoration phase, the upper surface of the backfilled materials will be graded so as to ensure surface water run-off falls to the floor of the pit and thereafter, via a network of drainage channels through the basal silt, toward the southern pond. As the surface water pond on the quarry floor is not hydraulically connected to the groundwater table, no intermediate settling ponds need be provided as suspended solids in surface water run-off will settle out in the surface water pond.

Temporary access ramps into and out of the active backfilling areas will generally be constructed at a gradient of approximately 1v:10h. Temporary side slopes will be constructed at gradients no greater (steeper) than 1v:1.5h in order to ensure stability. On completion, final gradients across the restored ground surface will be very shallow, generally no greater than 1v:15h, as indicated on Figure 2.4.

2.3.9 Bund Design

Given the inert nature of the materials being used to restore the application site, no provision is made in the restoration scheme for construction of perimeter / containment bunds at the boundary of each restoration area.

2.3.10 Capacity and Lifespan

The estimated volume of material to be placed at the application site is approximately 350,000m^3 (equivalent to approximately 750,000 tonnes). The duration of backfilling activities at the quarry void will largely be dictated by the rate at which approximately 620,000 tonnes of externally sourced inert soil and stone is imported to the site. There are many factors which will influence this in turn, including, but not limited to,

- Availability of acceptable inert materials at construction sites
- Prevailing economic climate
- Construction industry output
- Project location, scale, duration and distance from the facility
- Logistical and/or programming constraints at sites generating inert materials
- Climatic conditions (reduced construction activity in wet weather)
- Availability of hauliers
- Disruptions along the existing local and national road network
- Capacity of earthmoving plant to place and compact materials
- Waste inspection / weighbridge processing constraints

In light of these and other variables, calculation of intake rates and duration is not an exact science. At the present time, assuming 50 working weeks in each calendar year, 5.5 days per working week and 10 hours per working day, it is estimated that the rate of importation of inert materials to the quarry void could vary between 100,000 tonnes and 550,000 tonnes per annum (the maximum equivalent permitted by the recent planning permission issued by Wicklow County Council).

The corresponding duration of backfilling activities could therefore vary from just over 1 year to 7.5 years. Assuming an average importation rate of 200,000 tonnes/year, the expected duration of quarry backfilling activities will be just over 3 years.

It is currently envisaged that recovery of imported and site-generated C&D waste will continue while backfilling, restoration and aftercare management activities progress at the former quarry. It is however envisaged that recovery of C&D waste will continue for some time following completion of quarry backfilling activities.

2.3.11 Basal and Side Slope Liner Design

Given the inert nature of the materials being used to restore the application site, no provision is made for installation of a basal liner or side slope liners at this facility, nor is any provision made for a drainage blanket at the base of the backfilled materials. It is considered that the fine sandy silt at the base of the former quarry will be of relatively low permeability and will, in reality, function as act as a quasi-liner.

Surface water ponds occur at a number of locations across the floor of the former quarry. In order to minimise the potential impact on the underlying groundwater aquifer, it is proposed to lower the water level in the existing surface water ponds prior to the importation and placement of inert fill materials, as previously outlined in Section 2.2.9.

2.3.12 Leachate Management System

Given the inert nature of the materials being used to restore the application site, no provision is made for a leachate management system at this facility.

2.3.13 Landfill Gas Management System

Given the inert nature of the materials being used to restore the application site, no provision is made for a leachate management system at this facility.

2.3.14 Capping and Decommissioning

The application site will be restored on a phased basis to give a landform similar to that existed prior to extraction of sand and gravel. On completion, the final landform will be profiled to give a domed shape in order to facilitate surface water run-off over surrounding agricultural land or vertically downward into in-situ sand and gravel beyond the former quarry excavation, refer to contour map in Figure 2.4.

A cover layer comprising 150mm of topsoil and approximately 300mm of subsoil shall be placed over the inert backfilled materials on completion of each phase of restoration. This will be immediately planted with grass in order to promote stability and minimise soil erosion and dust generation. The lands will then be progressively returned to use as agricultural grassland.

Topsoil and subsoil will be imported to the site on a continual basis and shall not be used in the general backfilling of the site. The topsoil and subsoil shall be stockpiled pending re-use in the phased restoration of the site. They shall be stored separately within the application site, away from the active backfilling area and in such location and manner as not to create any temporary adverse visual impact.

On completion of the fourth (and final) phase of the restoration works, all mobile plant and equipment associated with the backfilling, placement and compaction of soil will be removed off site. Any dedicated infrastructure and/or services will also be progressively decommissioned and removed off-site. Any plant and equipment required for C&D waste recovery activities will however remain in place.

Wherever necessary, hardstanding surfaces will be broken up using a hydraulic breaker and subjected to validation testing to confirm the materials are acceptable for re-use within the Applicant's landholding for construction of haul roads and/or other hardstanding areas. Any materials which are found to exceed inert waste criteria will be transferred-off site to a suitably licensed waste disposal or recovery facility.

2.4 WASTE ACCEPTANCE AND HANDLING

Only inert, uncontaminated soils and construction and demolition waste shall be accepted at the application site. Inert materials shall be accepted at the site between 08.00 hours and 18.00 hours each weekday and 08.00 hours to 13.00 hours on Saturday. No materials shall be accepted at any other time including Sundays and Public Holidays.

2.4.1 Quarry Backfilling / Restoration Activities

Insofar as practicable, the source of each consignment of soil imported to site for backfilling purposes shall be identified in advance and subject to basic characterisation testing to confirm that soils at that location can be classified as inert. Waste characterisation (ideally including an element of testing) will be undertaken in advance by Clients and/or Contractors forwarding soil to the application site.

All inert soils imported to the site shall be unloaded (end-tipped) from trucks at the active backfilling face. It will be visually inspected by site personnel at that point to ensure that there is no intermixed non-hazardous or hazardous waste placed within it. If, following acceptance of waste, there is any concern about the nature of the wastes imported to site, it will be segregated and transferred to the waste inspection and quarantine facility for closer inspection and classification. A detailed record will be kept of all such inspections. Should inspections and/or subsequent testing indicate that the materials 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 licensed / permitted waste disposal or recovery facility.

In addition to the above, a representative sample shall be taken from one in every 500 loads of inert soil accepted at the facility and subjected to a less extensive scope of testing (compliance testing) focusing on key contaminant indicators. These data shall be used to confirm that the accepted soils are inert and comply with acceptance criteria. Compliance testing shall be undertaken by the Applicant.

An outline Waste Handling and Acceptance Plan for this waste facility is provided in Appendix 2.1 of this Environmental Impact Statement.

2.4.2 C&D Waste Recovery Activities

The processing and/or recovery of C&D waste at the application site will continue to be restricted to stones, granular fill, concrete, blocks, bricks and ceramic tiles. Should any non-inert construction and demolition waste (principally metal, timber, PVC pipes and plastic) occur amongst the C&D waste imported to site, it shall be separated out and temporarily stored in skips prior to removal off-site to appropriately licensed or permitted waste disposal or recovery facilities

Operating procedures at the existing construction and demolition waste facility require all construction and demolition waste forwarded for recovery purposes to be pre-sorted at source,

inert and largely free of any non-hazardous / hazardous domestic, commercial or industrial wastes. Any consignments of construction and demolition waste which have such materials intermixed in them will be immediately rejected and removed off site.

2.5 ENVIRONMENTAL NUISANCE CONTROL

2.5.1 General

Restoration and ongoing construction and demolition waste recovery activities at the application site require a number of environmental controls to eliminate or minimise the nuisance to the public arising from the importation, placement and compaction of inert soils, the importation and recovery of construction and demolition waste and export of processed materials. The proposed environmental control measures are outlined in detail in the following sections.

The restoration works at the application site will ultimately be regulated by conditions attaching to any waste licence issued by the Environmental Protection Agency (EPA). Any additional control measures required by the Waste Licence, in addition to those outlined, will also be implemented.

2.5.2 Bird Control

As the materials being placed or recovered at the application site are free of putrescible (food / kitchen) waste, site activities are unlikely to attract scavenging birds such as gulls and crows for the duration of the restoration works. Accordingly, it is not intended to implement any specific bird control measures at the site.

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

2.5.3 Dust Control

In dry, windy weather conditions, the ongoing restoration and recovery activities may give rise to dust blows across, and possibly beyond the application site. In order to control dust emissions, the following measures will be implemented:-

(i) access roads and/or internal roads will be wetted as and when required;
(ii) the quarry void shall be backfilled and restored in a phased manner and each phase shall be grassed as soon as practicable after placement of cover soils in order to minimise soil erosion and potential dust emissions;
(iii) the area of bare or exposed soils will, insofar as practicable, be kept to a minimum. Consideration will be given to establishing temporary vegetation cover over temporary surfaces pending final backfilling and restoration to original ground level;
(iv) all HGV's exiting the site shall be routed through a temporary wheelwash facility at the end of the internal paved site road (refer to Figure 2.2) in order to minimise transport of fines by HGVs on paved internal site roads and the public road network;
(v) stockpiling of imported soils will be minimized. Soils will ideally be placed and compacted in-situ immediately after being unloaded. If and when temporary stockpiling of soils is required, they will be placed as close as practicable to the centre of the site, away from nearby residences.

The amount of dust or fines carried onto the public road network will be further reduced by periodic sweeping of internal paved site roads and the existing local road leading to the site (Fassaroe Avenue).

2.5.4 Traffic Control

The proposed backfilling operations at the Fassaroe Plant entail the importation of 620,000 tonnes of material required to fill the void. This translates to a total of 31,000 HGV movements (assuming 20 tonnes per load) to fill the existing quarry void. Roadstone Dublin Ltd has defined a relatively optimistic scenario where it would be possible to fill the void at Fassaroe in just over a one year period. Although it is likely that it will take longer to fill this void, as a result of depressed market demand at the present time, this scenario has been adopted as the worst case traffic impact scenario.

The quarry restoration works will result in an increase in traffic volumes upon Fassaroe Avenue. In the worst case scenario, this increase in traffic volumes will result in an additional 20No. HGV vehicles during the peak hour period. This will result in a total daily two-way flow of 97 No. vehicles, or 1.5 vehicles a minute. Traffic studies indicate that although the capacity of Fassaroe Avenue has been reduced due to the implementation of traffic calming features, its existing capacity is more than adequate for the projected increase in generated traffic flows.

An assessment was undertaken of the existing Berryfield Roundabout to determine whether any adverse effects such as queuing or delay would be brought about as a result of the waste recovery activities. Traffic studies indicate that in the worst case scenario, there will be minimal queuing and delay at the roundabout and that it is sufficiently sized to cater for the additional traffic that could potentially be generated by the waste recovery facility.

Traffic studies indicate that even in the worst case scenario, there is adequate opportunity scenario for vehicles to enter and exit the residential properties along Fassaroe Avenue without undue delay. As the increase in traffic movements along the access road will increase the possibility of an accident occurring for vehicles exiting these properties, it is proposed to locally realign the road and establish a buffer zone outside these properties, thereby improving road visibility. Details of the proposed re-alignment are provided are discussed further in Chapter 12 of this EIS.

2.5.5 Litter Control

As the materials being placed or recovered at this site will be largely free of litter, the site restoration and recovery activities are unlikely to give rise to problems with windblown litter. Accordingly, it is not intended to implement any specific litter control measures at the site.

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

2.5.6 Odour Control

As the materials being placed or recovered at this site are not biodegradeable and do not therefore emit odourous gases, the site restoration and recovery activities will not give rise to odour nuisance. Accordingly, it is not intended to implement any specific odour control measures at the site.

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

2.5.7 Vermin Control

As the materials being placed or recovered at this site are free of putrescible (food / kitchen) waste, site activities are unlikely to attract vermin (rats) for the duration of the restoration works. Accordingly, no specific vermin control measures shall be implemented at the site.

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

2.5.8 Fire Control

As the materials being placed or recovered at this site are free of flammable materials and biodegragdeable waste which could create a fire or explosion risk, site activities will not present a fire risk for the duration of the restoration works. Accordingly, no specific fire control measures shall be implemented at the site.

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

(i) smoking at the application site and at the site office will be prohibited
(ii) any biodgradeable or flammable waste included in materials imported to site shall be immediately transferred to the on-site waste quarantine facility pending removal off-site to a licensed waste disposal or recovery facility
(iii) plant and equipment will be removed if they exhibit signs of overheating etc.

In the unlikely event that a fire does occur, the local fire stations in Bray and/or Wicklow will be contacted and emergency response procedures will be implemented. Fire extinguishers (water and foam) will be provided at the site office to deal with any small outbreaks which may occur.

2.6 ENVIRONMENTAL MONITORING

2.6.1 General

There is an established programme of environmental monitoring at the application site which complies with requirements of the existing waste permit issued by Wicklow County Council. In addition, Roadstone Dublin operates an environmental management programme to monitor and manage emissions for the adjacent aggregate processing and concrete production facilities. No limit values for environmental emissions arising from established activities are identified by existing waste permits or planning permissions. It is expected that such limits will be set by the EPA should it decide to issue a waste licence in respect of the waste recovery facility.

Environmental sampling, monitoring and testing will largely be undertaken by the Applicant's in-house environmental staff as required. Records of environmental monitoring and testing will be maintained on-site and will be forwarded to the EPA as required under the terms of the waste licence. A site plan showing all proposed environmental monitoring locations is provided in Figure 2.11.

2.6.2 Dust Monitoring

Dust emissions from all established activities within Roadstone Dublin's landholding are currently measured on a quarterly basis using Bergerhoff dust gauges at 2 No. locations across the site, shown on Figure 2.1. These gauges are located close to existing emission sources within the landholding and are considered to represent an upper bound on dust emission levels from established site activities.

It is currently envisaged that the two existing dust monitoring stations will be supplemented by a third close to the northern boundary of the application site and Roadstone landholding. These dust monitoring stations will remain in place for the duration of the site restoration works and for as long as waste recovery / aftercare management activities continue thereafter.

2.6.3 Ecological Monitoring

In the absence of any rare or vulnerable species of flora or fauna at, or in the immediate vicinity of, the application site, it is not intended to undertake any ecological monitoring during the site restoration works.

2.6.4 Groundwater Monitoring

3 No. groundwater monitoring wells have recently been installed across Roadstone Dublin's landholding at Fassaroe (in December 2008). At the present time, it is envisaged that groundwater sampling and testing will be undertaken by external consultants on a bi-annual basis at the 3 No. groundwater monitoring wells within the application site. Groundwater levels will also be recorded on a bi-annual basis. The location of the existing groundwater monitoring wells is indicated in Figure 2.11.

Groundwater samples are currently tested for a wide range of physical and chemical parameters in order to assess water quality and detect possible contamination at the site. Further detail on these data is presented in Section 6 of this Environmental Impact Statement.

It is currently envisaged that the existing groundwater monitoring regime will remain in place for the duration of the site restoration works. Groundwater sampling and monitoring will continue as long as backfilling activities continue and for a short period thereafter.

2.6.5 Landfill Gas Monitoring

In the absence of biodegradable waste amongst the inert materials used to backfill and restore the application site, no landfill gas can be generated and accordingly no provision has been made for landfill gas monitoring at this facility.

2.6.6 Leachate Monitoring

In the absence of biodegradable waste amongst the inert materials used to backfill and restore the application site, no leachate can be generated and accordingly no provision has been made for leachate monitoring at this facility.

2.6.7 Meteorological Monitoring

At the present time, no meterological monitoring is undertaken at the application site. It is understood that temperature, rainfall, sunshine, wind speed and direction are recorded at the weather station in Baldonnell, Co. Dublin, approximately 22km west northwest of the application site.

It is currently envisaged that representative meteorological data will be acquired from weather stations at Casement Aerodrome, as and if required.

2.6.8 Noise Monitoring

Noise emissions from established restoration and recovery activities are currently monitored on a quarterly basis (i.e. three monthly) basis at 4 No. noise sensitive sites around Roadstone Dublin's existing landholding, between existing noise emission sources and nearest sensitive receptors, all of which are private residential property. The existing noise monitoring locations are indicated in Figure 2.11.

It is currently envisaged that the existing noise monitoring regime will remain in place for the duration of the site restoration works and for as long as other production activities continue on site thereafter.

Noise monitoring will be undertaken using a Larson Davis Model 824 Sound Level Meter, calibrated using a Larson Davies Acoustic Calibrator CAL 200 (or equivalent).

2.6.9 Odour Monitoring

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

Site staff will report and record any odour emissions at the site in the highly unlikely event that a complaint is made about odours emanating from the site.

2.6.10 Surface Water Monitoring

It is envisaged that surface water sampling and testing will be undertaken by external consultants on a bi-annual basis (i.e. six monthly) basis at the **northern and southern (SW1 and SW2)** pond on the quarry floor. The **locations** of **proposed** surface water monitoring locations **are** indicated on Figure 2.11. **This includes monitoring of treated run-off on the downstream end of the proposed bypass interceptor to be installed in the south-western corner of the concrete production yard (SW3).**

Surface water samples will be tested for a wide range of physical and chemical parameters in order to assess water quality and detect possible contamination at the site. Further detail is presented in Section 6 of this Environmental Impact Statement.

It is currently envisaged that the surface water monitoring regime will remain in place for as long as these surface water bodies remain at the application site (ie. until they are backfilled with inert materials).

2.6.11 Stability and Settlement Monitoring

On completion of each phase of restoration, a number of fixed stations will be set into the ground surface across the restored area and will be surveyed annually in order to assess the magnitude of settlement and instability (lateral movement), if any, which may subsequently arise.

Temporary slopes, both in natural in-situ soil along the perimeter of the former extraction area and in the restoration soils will be visually inspected on an ongoing basis, at least once a month by site staff and a record will be kept of same. Should these inspections give cause for concern, an inspection of the affected area will be undertaken by an appropriately qualified engineer and measures will be implemented to address any instability identified.

Following completion of restoration works and closure of the facility, stability and settlement monitoring will be undertaken only if required by the waste licence.

2.7 FINAL RESTORATION AND AFTERCARE

The principal activity undertaken at the application site is restoration of lands within a former sand and gravel quarry. As previously noted in Section 2.3.14, the application site will be restored on a phased basis to give a landform which merges into the surrounding undulating landscape, refer to final site contour map in Figure 2.4. An outline of the proposed phasing plan is provided in Figure 2.5.

On completion, the final landform will be profiled to facilitate surface water run-off over the ground surface or into the in-situ sand and gravels beyond the site boundary, refer to the final site contour map in Figure 2.4. The final landform will be planted with grass in order to promote stability and minimise soil erosion and dust generation and the lands will be progressively restored to use as agricultural grassland.

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

Recovery of C&D waste at this facility will continue for the duration of the site backfilling and restoration activities. It is currently envisaged that C&D waste recovery activities will continue thereafter, either as a permitted or locenced waste activity and consequently all associated plant, equipment and infrastructure will remain in place.

Wherever possible, hardstanding surfaces will be broken up using a hydraulic breaker and subjected to validation testing to confirm the materials are acceptable for re-use within the Applicant's landholding for construction of internal haul roads and/or hardstanding areas. Any materials which are found to exceed inert waste criteria will be transferred-off site to a suitably licensed waste disposal or recovery facility.

2.8 CONTINGENCY ARRANGEMENTS

Details of existing contingency arrangements at the application site are provided in the contingency plan, a copy of which is provided in Appendix 2.2 of this report.

FIGURES

SECTION 6: WATER

6.1 INTRODUCTION

SLR Consulting Limited (SLR) has been retained by Roadstone Dublin to undertake a hydrogeological and hydrological impact assessment for the continued operation of an existing construction and demolition (C+D) waste recovery facility at Fassaroe, Co. Wicklow and proposed restoration of an adjoining worked-out quarry at the same location using inert waste, principally soil and stone.

This EIS section details the local hydrology and hydrogeology of the application site and surrounding area (up to 4km radius around the site boundary) and identifies potential hydrogeological and hydrological impacts associated with the existing and proposed waste recovery facilities.

Unmitigated potential impacts, assuming that no mitigation measures are in place, are considered for the initial assessment. Thereafter, a number of appropriate mitigation measures are identified and the potential impacts are reassessed assuming the proposed measures are implemented. The assessment is based on a detailed baseline description and evaluation of the existing local hydrogeological and hydrological regimes.

6.1.1 Background

Roadstone Dublin's landholding at Fassaroe is currently used for the screening and washing of sand and gravel imported from other quarries and for the recovery (processing) of imported inert C&D waste. The proposal to backfill and restore the existing quarry void using imported soils and stones generated by construction and demolition activities is technically classified as recovery of waste through deposition on land. The large volume of imported inert soil and stone required to complete this task requires a Waste Licence Application to be submitted to the Environmental Protection Agency, together with a supporting Environmental Impact Statement.

This chapter presents an assessment of the environmental impact of the waste recovery activities at the site on the hydrogeological and hydrological environment. Further information on the waste types and proposed schedule of works is detailed in Section 2 of this EIS.

6.1.2 Scope of Work

This chapter identifies the local hydrogeological and hydrological environment based on available information in the vicinity of the site. A qualitative assessment has been undertaken of the potential impacts on this environment arising from proposed backfilling of the sand and gravel quarry using imported inert backfill materials. The assessment considers the proposed phasing of the infilling, the waste types and proposals for water management at the site. The methodology of the assessment is described in detail in Section 6.3.1.

6.1.3 Sources of Information

The following sources of information have been consulted in order to investigate the hydrogeology and hydrology of the area surrounding the application site:

- The Environmental Protection Agency website (www.epa.ie) for maps and environmental information;
- Geological Survey of Ireland website (www.gsi.ie);
- Geology of Kildare-Wicklow, Sheet 16, 1:100,000 scale, Geological Survey of Ireland, 1995;
- Groundwater Protection Schemes, Department of the Environment and Local Government, Environmental Protection Agency, and Geological Survey of Ireland, 1999, and Appendix Groundwater Protection Response for Landfills; and

6.1.4 Contributors

This study of surface water and groundwater was undertaken and prepared by:

Les Brown, B.Sc., M.Sc. Ph.D., Senior Hydrogeologist, SLR Consulting Ireland

6.2 RECEIVING ENVIRONMENT

6.2.1 Available Information : Geology and Soils

A detailed description of the local and regional soil, subsoil and bedrock geology is provided in Section 5. A summary is provided below.

Soils and Subsoils
The Environmental Protection Agency (EPA) website publishes soils and subsoils maps created by the Spatial Analysis Unit, Teagasc in collaboration with the Geological Survey of Ireland and the Forest Service. These maps indicate that, prior to development, the majority of the application site was originally underlain by shallow well drained mineral soils, which are classified as grey brown podzolics. These soils were derived from glaciofluvial subsoils parent material which underlies the site (refer to Figure 5.2 in Chapter 5 of this EIS).

The subsoils (Quaternary drift deposits) occurring across and beneath the entire site comprise glaciofluvial sand and gravels derived (mainly) from Carboniferous Limestones. From a review of published topographic and geological maps it is expected that the sands and gravels are laterally extensive to the north and west and will have a thickness in excess of 20m thick. Due to the relatively steep topography it is also expected that the sand and gravel will have a thick unsaturated zone.

Solid Geology
The superficial deposits under the entire site and surrounding area are underlain by bedrock of the Maulin Formation and the Glencullen River Formation (refer to Figure 5.2 in Section 5). The published geological map of the area shows that these formations are part of the Ribband Group and are of Lower Ordovician age. The Maulin Formation comprises of slates, phyllites and schists whilst the Glencullen River Formation comprises tuffs and greywacke.

Local Geology
Three groundwater monitoring wells (designated BH1, BH2 and BH3) were installed across the application site in December 2008. The locations of the monitoring wells are shown in Figure 6.1. The monitoring wells were drilled using rotary techniques, and as a result, it was only possible to obtain general descriptions of the quaternary subsoil deposits encountered during well drilling. In general, the monitoring wells encountered sand and gravel overlying gravelly clay. The boreholes were drilled to depths of 21m (BH1), 24m (BH2) and 30m (BH3). Subsoils encountered during drilling are described as follows:

- MADE GROUND (sandy gravelly clay);
- Fine to medium to coarse brown SAND;
- Stiff brown CLAY; and,
- Slightly sandy, gravelly CLAY.

Stiff clay and gravelly clay was encountered in BH3 but not in BH1 or BH2, which encountered sand and gravel. Monitoring well construction records are presented in the groundwater well installation report, reproduced as Appendix 6A.

6.2.2 Available Information : Hydrogeology

Aquifer Characteristics and Groundwater Vulnerability
The published geological memoir for the region reports that sands and gravels cover a significant part of this region of Ireland and can be developed to provide reasonable water supplies. Well yields in the bedrock are generally only sufficient for domestic or farm supplies and range from 20m^3/d to 50m^3/d, except along faults where they may be in excess of 200m^3/d.

The published geological memoir also indicates that the bedrock hydrogeology in this region of Ireland is dominated by secondary fissure permeability. This is the case for both the Maulin Formation and Glencullen River Formation, which are considered to be aquitards. The bulk permeability of both bedrock formations is low, with groundwater storage and movement constrained to the upper weathered horizons of this unit and fractures / faults.

The Quaternary strata play an important role in the groundwater flow regime of this region. The sands and gravels allow a high level of recharge, provide additional storage to the underlying bedrock aquifers and, where sufficiently thick, can be an aquifer in their own right. Well yields for the sand and gravel deposits are typically between 100m^3/d and 3000m^3/d.

Aquifer maps published on the GSI and EPA websites indicate that the application site is located above a locally important sand and gravel aquifer, which is extensive to the north and west of the site boundary. The subsoil map presented as Figure 5.1 in Chapter 5 shows the extent of the sand and gravel deposit.

Groundwater vulnerability maps indicate that the site is located within an area having High Groundwater Vulnerability status. An extract of the Groundwater Vulnerability map is presented as Figure 6.3. The groundwater vulnerability reflects the high recharge acceptance of the sand and gravel deposits.

Groundwater in the sand and gravel aquifer has not been intercepted by the former quarry workings. Surface water ponding that occurs across the quarry floor is perched above the water table above deposits of silt and clay generated by sand and gravel processing (washing) activities at the site.

Recharge Mechanisms
Published data (including the geological memoir for the area) indicates that rainfall in North Wicklow is of the order of 700mm/yr to 1000mm/yr. Potential recharge to the aquifers ranges from 325mm/yr to 550 mm/yr, depending on the elevation and location. The bulk of this recharge occurs between late October and early March. Although the ground wets after rainfall, it drains rapidly. This, coupled with the lack of surface water features across the area, indicates that the sand and gravel aquifer has a high recharge acceptance and that the unsaturated zone has a high permeability.

Groundwater Levels and Flow
The published geological memoir for the region reports that the groundwater table in elevated sand and gravel deposits can be relatively deep, with the deposit having a thick unsaturated zone.

During drilling and installation of groundwater monitoring wells in December 2008, groundwater strikes were recorded in each well. A summary of water strikes is presented in Table 6.1 below :

Borehole Name	Surface mOD	Water Strike (mbgl)	Water Strike (approx. mOD)	Deposits recorded at water strike
BH1	79	18.00	61.0	Saturated, brown silty, medium SAND with gravel
BH2	81	20.00	61.0	Saturated, brown sandy CLAY
BH3	87	15.00	72.0	Saturated, brown silty, gravel medium SAND

Table 6.1. Groundwater Strikes Recorded during Drilling

Water levels were also recorded in early January 2009, approximately three weeks after drilling had ceased; groundwater was recorded at the following rest levels:

- BH1 – dry
- BH2 – 61.7m OD (19.29mbgl)
- BH3 – 65.7m OD (21.26mbgl)

Although BH1 intercepted water during drilling and water levels were maintained for some days following drilling, the well dried out some weeks after installation.

Groundwater contours based on the rest levels recorded in the new boreholes have been used to determine groundwater flow contours, and these are presented on Figure 6.4. The groundwater contours show that the indicative groundwater flow direction is eastwards. It is considered that any groundwater movement in the upper weathered horizons of the bedrock formations will be in hydraulic continuity with the overlying sand and gravel unit.

The final floor level across the former quarry is understood to have been approximately 70mOD, and possibly deeper locally at sumps (typically 68mOD). The aerial photograph attached in Plate 6.1 dates from May 1997 and indicates that the floor of the excavation at that time (typically at 70mOD) was dry and therefore clearly above the groundwater table. Inspection of later aerial photography on the Ordnance Survey website indicates that the plan footprint of the pond in both 2000 and 2005 was significantly less that that recorded in September 2008. The relatively high water level in the pond recorded in September 2008 (75.6mOD) is attributed to the high incidence of rainfall over the previous two summers.

From these data it is apparent that:

- The ponds on the quarry floor is rainwater which is perched approximately 5m to 7m above the groundwater table.
- The water table is considered to be steep for a sand and gravel deposit. This suggests that the lower part of the subsoil stratigraphy has a lower permeability.
- The lack of surface water features and high recharge acceptance indicates the upper part the deposit has a higher permeability.

Groundwater Abstractions, Use and Quality
All local residences are understood to be supplied by Local Authority mains. Water for on-site processing and washing of sand and gravel is sourced from the ponds on the abandoned quarry floor.

Groundwater samples were obtained for hydrochemical analysis from monitoring wells BH2 (down-gradient of the quarry floor) and BH3 (up-gradient of the quarry floor) in January 2009. As part of the sampling procedure each well was purged prior to the sample collection. However, in both cases the inflow to each well was minimal causing the well to dry up before the required volume had been removed. Both wells were allowed to recharge prior to groundwater samples being taken. The drying out of both wells confirms that the lower stratigraphy of the subsoil is of a lower permeability than the upper part.

A surface water sample was collected from the ponds perched on the floor of the former quarry. All water samples were sent to an independent accredited laboratory for analysis. A summary of reported water quality is presented as Table 6.2 below:

Parameter	Sampling Locations			EU Drinking Water Standards (98/83/EC)
	BH2 (down gradient)	BH3 (up gradient)	SW1 (quarry floor)	
Field Tests				
Temperature ℃	8.4	10.02	1.33	-
Conductivity µS/cm	457	644	300	2500
pH	8.11	7.58	8.59	2500
Dissolved Oxygen	12.3	7.12	14.94	-
Laboratory Tests				

Table 6.2 Summary of Groundwater Quality

Parameter	Sampling Locations			EU Drinking Water Standards (98/83/EC)
	BH2 (down gradient)	BH3 (up gradient)	SW1 (quarry floor)	
Total Hardness (mg/l)	213	274	100	-
Total Alkalinity (mg/l)	130	210	80	-
TOC (mg/l)	3	<2	-	No ab. ch.
BOD (mg/l)	-	-	<2	-
DRO (µg/l)	-	-	<10	-
PRO (µg/l)	-	-	<10	-
Mineral Oil (µg/l)	-	-	<10	-
Benzene (µg/l)	-	-	<10	-
Toluene (µg/l)	-	-	<10	-
Ethylbenzene (µg/l)	-	-	<10	-
Total Xylene (µg/l)	-	-	<10	-
Dissolved Sodium (mg/l)	15.6	22.7	13.7	200
Dissolved Potassium (mg/l)	2.8	2.3	4.4	-
Dissolved Calcium (mg/l)	67	98	36	-
Dissolved Iron (ug/l)	36	20	9	200
Dissolved Magnesium (mg/l)	11	7	2	-
Dissolved Manganese (ug/l)	261	39	<1	50
Chloride (mg/l)	23	15	17	250
Ammoniacal-N (mg/l)	<0.2	<0.2	<0.2	-
Nitrite (mg/l)	0.12	0.11	0.09	0.5
Nitrate (mg/l)	3.6	13.0	3.6	50
Sulphate (mg/l)	29	38	40	250
Phosphate (ortho) (mg/l)	0.04	0.06	0.08	-

KEY: Shaded = maximum admissible concentration exceeded

Table 6.2 (cont'd) Summary of Groundwater Quality

Groundwater quality is considered to be good. With the exception for high levels of manganese in BH2, all parameters analysed for had ion concentrations lower than the EU Drinking Water Standards. Water quality is also good for the ponded water which lies on the quarry floor. Additional List I analyses for Diesel and Petrol Range Organics, Mineral Oils, Benzene, Toluene, Ethylbenzene and Total Xylene, were undertaken on the sample obtained from the surface water pond on the quarry floor. None of these contaminants were detected in the tested samples.

The hydrochemistry of the groundwater samples indicate hard calcium-type water with moderately low sodium and magnesium. This type of water is typical of groundwater from sand and gravel with limestone parent material. Potassium, chloride, ammoniacal nitrogen, nitrite and nitrate are all low and indicate minimal organic contamination. The nitrate level in BH3, although still low, is higher than BH2 and is most likely due to its closer proximity to agricultural land.

There are a small number of hydrochemical variations between up-gradient and down-gradient monitoring wells across the former sand and gravel pit. Most notable of these is the concentration of manganese, which is considerably higher down-gradient than up-gradient. This variation in manganese is most likely to be due to geological factors. The hardness and alkalinity reduce down-gradient of the quarry, which is most likely to be due to mixing caused by rainwater perched on the quarry floor seeping down to the water table and recharging groundwater. The other main constituents show only a slight variation up-gradient and down-gradient of the quarry.

Groundwater Protection
Groundwater in Ireland is protected by European Community and national legislation. The Geological Survey of Ireland (GSI) in conjunction with the Department of Environment and Local Government (DoELG) and the EPA has developed a methodology for the preparation of groundwater protection schemes to assist the statutory authorities and others to meet their responsibility to protect groundwater (DoELG / EPA / GSI, 1999). This methodology incorporates land surface zoning and groundwater protection responses.

The DoELG / EPA / GSI have developed a scheme (Groundwater Protection Response Matrix for Landfills) to assessing potential landfill sites on the basis of groundwater vulnerability and aquifer status. However, it should be noted that this scheme has largely been developed for new, non-hazardous landfills, and is therefore not an appropriate tool for assessment of established inert waste recovery facilities such as that at Fassaroe.

Notwithstanding this, review of the Groundwater Vulnerability Map (Figure 6.4) and the Aquifer Map (Figure 6.3) in accordance with the DoELG / EPA / GSI methodology indicates that the Fassaroe site is located within an area of High Vulnerability and a Locally Important Sand/Gravel Aquifer. These classifications have been compared against the matrix for non hazardous landfills; which indicates that the site setting falls within a response category of R3[1], which is described as being 'Not generally acceptable (for non-hazardous landfills), unless it can be shown that :

- The groundwater in the aquifer is confined; or
- There will be no significant impact on the groundwater; and
- It is not practicable to find a site in a lower risk area'.

Given that quarry backfilling / inert soil recovery activities can only be undertaken where previous activities have created void space in the landscape, the additional requirement to identify other sites in lower risk areas does not apply. In any event, the backfilling of existing (perched) groundwater ponds and provision of inert soil cover (predominantly cohesive till) will provide an enhanced degree of protection to the aquifer, over and above that which exists at present.

Given the limited risk to groundwater associated with the placement and compaction of inert soil and stones compared to those presented by non-hazardous landfills, it is considered that the site setting is appropriate for an inert soil recovery facility. It is also reiterated that the DoELG / EPA / GSI groundwater protection methodology has not been developed for existing inert landfills or waste recovery facilities. Further to this, the significance of the impact of the proposed waste recovery activities on groundwater is fully explored in Section 6.3.

6.2.3 Available Information : Hydrology

Local Hydrology and Surface Water Quality
The nearest watercourse to the site is the Cookstown River, which is named as the Glencullen River upstream of Enniskerry (2km west of the site). This watercourse is a tributary of the Dargle River, and is located within the Eastern River Basin District. The Cookstown River lies 200m to the south of the site access road. Ordnance Survey mapping indicates that this watercourse is fed by waters from the Glencullen area.

In 2003 biotic sampling from the Glencullen River, 2km upstream of Enniskerry and 4km upstream of the site was reported to be of a good status (Q value of 4). Biotic sampling undertaken approximately 1km downstream of the site in the Cookstown River, just before it's confluence with the River Dargle also recorded good status (Q value of 4).

Surface Water Flows and Discharge Consents
The EPA website indicates that there are no hydrometric stations within 5km of the site, and therefore no flow statistics are available for the watercourses close to the site. There is currently no information on discharge consents in the immediate vicinity of the site.

Flooding
The Office of Public Works website (www.floodmaps.ie) indicates that there are no records of historic flooding recorded within 1km of the site, and therefore the continued operation and development of waste recovery facilities at the application site is not considered to present any risk of flooding. Surface water runoff and discharges at site will be managed so that they do not increase the risk of flooding in the vicinity of the proposed development area. The proposed restoration profile allows water to be shed to the south and east of the application site, where it can infiltrate into the permeable sand and gravel aquifer.

6.2.4 Field Surveys

Site visits were undertaken by a senior SLR hydrogeologist between the 1st and 12th December 2008. The following observations were noted:

- the majority of the application site was dry underfoot, with no surface water features;
- following rain the site became muddy but soon dried out;
- the quarry floor is covered by silt and clay deposits from historical sand and gravel washing operations;
- the pond on the quarry floor is perched above groundwater in the sand and gravel aquifer, and as such is not representative of the groundwater table;
- although there are areas of the surrounding lands that are moist, no springs or other groundwater features were observed and,
- there is seepage from the quarry floor to the underlying unsaturated aquifer. However, due to the layer of silt and clay, this seepage is minimal. During particularly wet years ponding occurs on the quarry floor. Seepage from the ponds will increase as the water depth increases.

Photographs of the site are presented in Plates 6.2 and 6.3 at the end of this chapter.

6.2.5 Limitations

The assessment provided herein is based on visual observations and measurements from site visits, published information, well drilling information and discussions with site staff and is a qualitative assessment.

6.3 IMPACT OF THE SCHEME

6.3.1 Evaluation Methodology

The impact of the proposed development (as detailed in Chapter 2) is assessed in this section. The methodology applied in the assessment is a qualitative risk assessment methodology in which the probability of an impact occurring and the magnitude of the impact, if it were to occur, are considered. This approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the development. This approach allows effort to be focused on reducing risk where the greatest benefit may result. The assessment of risk is outlined below in Table 6.3.

Probability of Occurrence	Magnitude of Potential Impacts			
	Severe	Moderate	Mild	Negligible
High	High	High	Medium	Low
Medium	High	Medium	Low	Near Zero
Low	Medium	Low	Low	Near Zero
Negligible	Low	Near Zero	Near Zero	Near Zero

Table 6.3 : Matrix Used to Assess Potential Impacts

The magnitude of potential impacts in relation to hydrogeology and hydrology are detailed in Table 6.4 below :

Magnitude	Potential Impact
Negligible	No alteration, or very minor changes with no impact, to watercourses, hydrology, hydrodynamics, erosion and sedimentation patterns; No alteration to groundwater recharge or flow mechanisms No pollution or change in water chemistry to either groundwater or surface water.
Mild	Minor or slight changes to the watercourse, hydrology or hydrodynamics; Changes to site resulting in slight increase in run-off well within the drainage system capacity; Minor changes to erosion and sedimentation patterns Minor changes to the water chemistry of surface run-off and groundwater Minor changes to water dependent ecosystems
Moderate	Some fundamental changes to watercourse, hydrology or hydrodynamics; Changes to site resulting in an increase in run-off within system capacity; Moderate changes to erosion and sedimentation patterns Moderate changes to the water chemistry of surface run-off and groundwater. Moderate changes to water dependent ecosystems
Severe	Wholesale changes to watercourse channel, route, hydrology or hydrodynamics; Changes to site resulting in an increase in run-off with flood potential Significant changes to erosion and sedimentation patterns Major changes to the water chemistry of surface run-off and groundwater Major changes to water dependent ecosystems

Table 6.4 : Magnitude of Potential Hydrological and Hydrogeological Impacts

In addition to nature and significance, the potential impacts will also be assessed in terms of their duration, whether they are direct or indirect impacts, and also if the impact will be cumulative.

The following sections identify the potential impacts of the proposed development on the geological, hydrogeological and hydrological environments. It also assesses the likelihood of occurrence of each identified impact in accordance with Tables 6.3 and 6.4. It should be noted that the impacts are initially assessed with no mitigation or design measures incorporated to reduce the risk.

6.3.2 Potential Impacts on Groundwater

Given the hydrogeological setting, it is considered that the proposed development has the potential to impact on groundwater in terms of both the groundwater quality and the groundwater flow regime. These are considered separately below.

Groundwater Quality
The operation of existing and proposed additional waste recovery facilities will create a risk of groundwater pollution from the following potential sources:

- accidental spillage of fuels and lubricants by traffic and/or construction plant importing or handling the inert fill and during other operational procedures;
- increase in suspended solids and potential for contaminated run-off entering groundwater during development of the site; and
- rogue loads of contaminated material being deposited at the site.

It is considered that without mitigation, the probability of occurrence of spillage of fuels, lubricants and other potentially contaminative liquids is ‘medium’ due to the area of the site and number of

vehicles that will be using the site and the magnitude of impact is 'moderate'. Therefore the overall risk to groundwater, without mitigation, is '*medium*'.

It is considered that without mitigation, the probability of occurrence of an increase in suspended solids and potential for contaminated run-off entering groundwater during operation of the facility is 'medium' to 'high' due to the time frame over which this may occur and the potential for direct tipping of inert fill high in silt content into groundwater. The magnitude of impact is 'moderate' and therefore the overall risk is '*medium*' to '*high*'.

Without mitigation the probability of occurrence of a rogue load which may have the potential to contaminate groundwater at the site is 'medium' and the magnitude of impact is 'mild' to 'moderate' depending on where the rogue load is deposited. The overall risk is considered to be '*low*' to '*medium*'.

Groundwater Flow
Without mitigation, or consideration of operational procedures, infilling the site with low permeability inert fill material has the potential to create a low permeability zone. This could alter the pattern of groundwater recharge through the unsaturated soils. Without mitigation, the probability of occurrence is 'medium' due to the extensive, thick and permeable nature of the unsaturated zone above the aquifer. The magnitude of the impact is assessed as 'low' as the resulting change to recharge will be small and localised to the area immediately around the backfilled quarry. The overall significance is therefore considered to be *'low to medium'*.

Is noted that (a) the regional permeability of the unsaturated zone of the sand and gravel aquifer is high, which will maintain regional groundwater flow direction, and (b) runoff shed from the proposed restoration landform will infiltrate to form groundwater recharge on the downstream side which will maintain aquifer recharge.

6.3.3 Potential Impacts on Surface Water

Given the site setting, it is considered that the potential impact of continued C&D waste recovery activities and backfilling of the former quarry with inert fill will have a negligible effect on surface water in the area for the following reasons:

- there are no surface water features within the site boundary (all water features within the application site are considered to be representative of groundwater and/or perched groundwater);
- run-off from the completed landform will recharge to ground within the Applicant's landholding boundary.

6.3.4 Summary of Potential Impacts

A summary of potential impacts *without mitigation* is presented in Table 6.5 overleaf :

Potential Impact	Spatial Impact, Duration, Direct/Indirect	Probability of Occurrence	Magnitude of Impact	Significance of Impact	Mitigation Required?
Groundwater Quality					
Spillages of fuel	Local, Short Term, Direct	Medium	Moderate	Medium	Yes
Release of suspended solids	Local, Long Term, Direct	Medium to High	Moderate	Medium to High	Yes
Rogue load of contaminated material	Local, Short Term, Direct	Medium	Mild to Moderate	Low to Medium	Yes
Groundwater Flow / Recharge to Aquifer					
Alteration / reduction in recharge to aquifer	Local, Long Term and Direct	Medium	Low	Low to Medium	No
Impermeable barrier to groundwater flow	Local, Long Term, Direct	Low	Moderate	Low	No

Note: it is considered that the potential impacts on the surface water from the development are negligible and as such, these are not detailed in this table.

Table 6.5 Summary of Unmitigated Risk and Magnitude of Potential Impacts at Fassaroe

Review of Table 6.5 indicates that if no mitigation measures are incorporated within the design and backfilling operation for the former sand and gravel quarry, there is potential for the site to cause detrimental and direct impacts to the superficial aquifer by locally polluting groundwater and creating a low permeability zone to groundwater flow. The impacts are all local, but range from short-term to long-term.

It is considered that if the identified potential impacts on either groundwater quality or groundwater flow were all to occur there would be a cumulative effect, which would increase the significance of the impact. It is therefore recommended that the mitigation measures outlined in the following section are incorporated to reduce the potential impact.

6.3.5 Do Nothing Scenario

Were the proposed backfilling and restoration of the application site not to proceed as proposed, it is unlikely that a portion of the land at least could ever be put to productive use and that it would remain as a scar on the landscape. A minor risk of groundwater contamination will exist for as long as the quarry exists. Ongoing vigilance will be required to ensure no potential contaminating activities occur on the quarry floor, especially in the vicinity of, the groundwater ponds.

6.4 MITIGATION MEASURES

Proposed mitigation measures required to reduce the potential impacts to acceptable levels are identified in this section. These measures either reduce the likelihood of an event occurring, or reduce the magnitude of the consequences if the event does occur. It should be noted that several of the mitigation measures proposed would have a positive effect on more than one potential impact.

6.4.1 Proposed Mitigation Measures

In order to mitigate against the risk of pollution to groundwater occurring during operation of the site the following management measures would be included:

- wherever possible a traffic management system would be put in place to reduce the potential conflicts between vehicles, thereby reducing the risk of a collision;

- a site speed limit would be enforced to further reduce the likelihood and significance of collisions;
- all plant would be regularly maintained and inspected daily for leaks of fuels, lubricating oil or other contaminating liquids/liquors;
- where possible, refuelling of plant and equipment should be undertaken at the surfaced area in the vicinity of the existing maintenance shed from the existing bunded fuel tank(s) in order to minimise the risk of uncontrolled release of polluting liquids / liquors;
- if necessary, refuelling of plant and equipment at the waste recovery facility should only be undertaken using mobile double skin bowsers;
- maintenance of plant and machinery would be undertaken at the existing maintenance sheds within the application site, as appropriate, to minimise the risk of uncontrolled release of polluting liquids;
- spill kits should be made available on-site to stop migration of spillages, should they occur;
- ponded areas on the quarry floor should be drained prior to the placement of the inert waste in order to minimise the mobilisation of fines,
- consignments of soil and stone forwarded to the facility should be inspected and tested to confirm they are inert prior to deposition at site.
- **Installing a bypass separator to treat / remove potential hydrocarbon contamination of surface water run-off arising across the existing concrete yard (which houses the proposed waste inspection and quarantine area).**

These measures would reduce the potential impact of

(i) spillage of fuels and lubricants from '*medium*' to '*low*',
(ii) an increase in suspended solids from '*medium to high*' to '*low*' and
(iii) contamination from rogue loads from '*low to medium*' to '*near zero*'.

In order to minimise potential impact on recharge to the aquifer from backfilling the quarry void with lower permeability soils, it is recommended that an infiltration swale or soakaway be constructed on the down-gradient side. The purpose of the swale / soakaway will be to capture any surface water shed over the restored ground surface and allow it to infiltrate to ground as recharge.

6.4.2 Residual Impacts

A summary of the proposed mitigation methods, together with the predicted effects and residual impacts is presented in Table 6.6 overleaf.

Examination of Table 6.6 confirms that there are no significant residual impacts with respect to groundwater provided the appropriate mitigation measures are undertaken. It is therefore considered that the continued operation of the C&D waste recovery facility and the proposed backfilling of the quarry void using inert soil and stones is acceptable and has no significant impact on groundwater or surface water in the area.

Potential Impact	Spatial Impact, Duration, Direct/Indirect	Probability of Occurrence	Magnitude of Impact	Significance of Impact	Mitigation Required?	Mitigation Measures	Mitigated Probability of Occurrence	Mitigated Magnitude of Impact	Residual Magnitude of Impact
Groundwater Quality									
Spillages of fuel	Local, Short Term, Direct	Medium	Moderate	Medium	Yes	Traffic systems, maintenance, bunding and spill kits	Low	Moderate	Low
Release of suspended solids	Local, Long Term, Direct	Medium to High	Moderate	Medium to High	Yes	Minimisation, management, and waste deposition measures	Low	Moderate	Low
Rogue load of contaminated material	Local, Short Term, Direct	Medium	Mild to Moderate	Low to Medium	Yes	Inspection and testing of waste loads	Negligible	Low to Medium	Near Zero
Groundwater Flow / Recharge to Aquifer									
Alteration / reduction in recharge to aquifer	Local, Long Term and Direct	Medium	Low	Low to Medium	Yes	Soakaway and engineering measures	Low	Low	Near Zero
Impermeable barrier to groundwater flow	Local, Long Term, Direct	Low	Moderate	Low	No				

Table 6.6 Summary of Mitigation and Residual Impacts at Fassaroe

PLATES

PLATE 6.1 Fassaroe Site Complex : Layout in 1997

PLATE 6.2 Standing Water at the Eastern End of the Worked-Out Sand and Gravel Quarry.

PLATE 6.3 Installation of Groundwater Monitoring Well BH1

FIGURES

APPENDIX 6.1

GROUNDWATER MONITORING WELL INSTALLATION REPORT (DECEMBER 2008)

ROADSTONE DUBLIN LIMITED

INERT WASTE RECOVERY FACILITY

AT FASSAROE, BRAY, CO. WICKLOW

ENVIRONMENTAL IMPACT STATEMENT

NON-TECHNICAL SUMMARY

REVISION A
OCTOBER 2010

Prepared by :
SLR Consulting Ireland
7 Dundrum Business Park
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Dublin 14

CONTENTS

1.0 INTRODUCTION

This Environmental Impact Statement (EIS) Non-Technical Summary provides supporting information to accompany a Waste Licence Application (WLA) to the Environmental Protection Agency (EPA) by Roadstone Dublin for continued operation of its existing construction and demolition waste recycling facility at Fassaroe, Bray, Co. Wicklow and the backfilling of the adjoining, worked out quarry void using imported and site-won inert soils. The principal waste activities at the site comprise

(i) backfilling and restoration of a former quarry using imported inert soil and stone and
(ii) recycling of construction and demolition waste.

The location of the site is indicated on an extract from the 1:50,000 scale Ordnance Survey Discovery series map of the area, reproduced as Figure 1. At the present time, traffic access to the site and is via the Fassaroe Junction on the N11 National Primary Road, along a section of local public road (Kilbride Road) and a 930m long private road (Fassaroe Avenue).

The amount of inert material to be imported and placed at the facility over its operational life is 750,000 tonnes (approximately 375,000m^3), of which approximately 620,000 tonnes must be imported. Up to an estimated 20,000 tonnes of inert construction and demolition waste will also be recovered at the facility on an annual basis. Inert materials to be placed and recovered at the facility will be sourced from construction and/or demolition sites where prior testing has indicated that no soil or material contamination is present.

The application area comprises a worked out quarry and surrounding land measuring covering an area of approximately 21.4hectares (51.5acres). Roadstone Dublin obtained planning permission for the existing construction and demolition waste facility at the application site in July 2004 (Wicklow County Council Planning Ref. No. 03/9501). The company also obtained waste permits in respect of these activities from Wicklow County Council (Ref. No. ESS/15/8/12) for successive three years periods from 2004. A grant planning permission to backfill and restore the quarry void was issued by Wicklow County Council on 4 March 2009 (Planning Register Ref. No. 08/1258).

The proposed recovery of inert soils at the former sand and gravel quarry at Fassaroe will eventually result in complete backfilling of a large open void, restore the landscape to its original pre-extraction condition and provide for better protection of the underlying groundwater resource, which is currently classified as 'highly vulnerable' due to the absence of any protective soil cover. The scheme will also provide for future development of the lands which are zoned for mixed use development in the Draft Bray Environs Local Area Plan 2009-2015.

2 RESTORATION SCHEME

2.1 Principal Elements

The proposed inert waste recovery facility at Fassaroe provides for

(i) Use of imported inert natural materials, principally excess soil, stones and/or broken rock excavated on construction sites, to backfill and restore a large existing void created by previous extraction of sand and gravel
(ii) Recovery of imported inert construction materials, including stones, granular fill, concrete, blocks, bricks and ceramic tile, using crushing and screening equipment to generate secondary (recycled) aggregate
(iii) Separation of any non-inert construction and demolition waste (principally metal, timber, PVC pipes and plastic) unintentionally imported to site prior to removal off-site to appropriately licensed waste disposal or recovery facilities
(iv) Use of secondary aggregate to construct internal haul roads within and across the application site
(v) Export of secondary aggregate off-site for re-use by others
(vi) Phased restoration of the backfilled void (including placement of cover soils and seeding) and return to use as agricultural grassland
(vii) Temporary stockpiling of topsoil and subsoil pending re-use as cover material for phased restoration of the site
(viii) Environmental monitoring of noise, dust, surface water and groundwater for the duration of the site restoration works.

2.2 Site Infrastructure

Inert materials are accepted at the site between 08.00 hours and 18.00hours each weekday and 08.00hours to 13.00hours on Saturday. Vehicular access to Roadstone Dublin's landholding and the waste recovery facility can only be obtained via Fassaroe Avenue. All vehicular traffic arriving must stop at the weighbridge in front of the existing site office before gaining access to the waste recovery facility. Within the site, trucks travel to and from the active restoration and recycling areas over a network of paved and unpaved roads. Trucks must pass through a new wheelwash facility before exiting the site.

Fuel for site plant and equipment will be stored at the existing maintenance sheds on Roadstone Dublin's landholding and/or in mobile double skin bowsers. HGV trucks can refuel at the existing refuelling facilities adjacent to the existing concrete production yard. Oil and lubricant changes for both wheeled and tracked plant will be undertaken at existing maintenance sheds.

A temporary portacabin office will be provided at the waste recovery facility, at the location shown on Figure 2. Staff employed at the facility will share established staff facilities with other Roadstone Dublin staff employed the concrete production and aggregate processing facilities which are located on the same landholding.

A waste inspection and quarantine area will be established at an existing A-frame shed at the concrete production yard which is constructed over a sealed concrete slab. Visual inspection, in-situ monitoring and testing of imported waste materials will be undertaken by Roadstone Dublin staff as inert waste materials are end-tipped, spread and placed at the active restoration area. Should there be any concern about the nature of the soil materials being end-tipped it will be loaded onto a truck and re-directed to the waste inspection and quarantine area for closer examination and inspection. Any suspect or unacceptable waste identified will be placed in skips and covered with plastic sheeting in order to minimise potential contamination of surface water run-off.

A temporary hardstanding area constructed of recycled aggregate is currently provided on the western side of the worked out quarry and is currently used for recovery of imported inert construction and demolition waste. Construction and demolition waste is recycled by passing it through a mobile crushing plant in order to create a particulate, granular fill which may exported off-site as secondary aggregate or alternatively may be used to construct hardstanding areas or temporary haul roads within the Fassaroe complex. Provision will be made for storage of any separated non-inert construction and demolition waste (including metal, timber, plastic etc.) at the waste inspection area prior to removal off-site to a licensed recovery facility.

Most rain falling over the site will percolate through backfilled or natural soils to the underlying groundwater table. Any surface water run-off **which falls over unpaved ground will be either be diverted to infiltration areas to be absorbed directly into the ground or** will flow over the ground surface to collect in existing surface ponds. Water collecting in surface ponds will ultimately discharge to the underlying groundwater table **or will be pumped to the existing large pond immediately south of the existing concrete production yard (known as the 'supply pond').**

Water in the silt ponds will be tested to confirm it meets quality standards prior to being discharged to the supply pond. A separator tank will be installed at the concrete production yard to treat any petrol or fuel contamination of surface water run-off which could potentially arise there. Pumping of surface water run-off from the concrete yard will be undertaken continuously to prevent surface water from ponding around low points.

2.3 Waste Recovery Activities

Backfilling of the former quarry will proceed in several phases and on completion, will merge into the surrounding landscape. A summary of the proposed phasing and the final ground level contours are shown in Figure 3.

It is currently envisaged that backfilling of the existing void will proceed from the northern to the southern end of the quarry, in 4 No. separate phases. Any temporary additional or replacement infrastructure required to facilitate the proposed works will be constructed and/or installed at the

outset of the first phase of backfilling. On completion of each restoration phase, a cover layer of subsoil and topsoil will be placed and graded across the backfilled soil. This will then be planted with grass in order to promote stability and minimise soil erosion and dust generation.

Near the end of the fourth (and final) phase of the quarry backfilling works, all relevant plant and equipment will be removed off site and any temporary infrastructure and/or services will be progressively removed or decommissioned. At the end of the backfilling operation, the ground surface will be profiled to give a domed shape to facilitate surface water run-off into in-situ sand and gravel soils beyond the backfilled area. The final landform will be similar to that existed prior to extraction of sand and gravel.

It is estimated that the rate of importation of inert materials to the quarry void could vary between 100,000 tonnes and 550,000 tonnes per annum. The corresponding duration of backfilling activities could therefore vary from just over 1year to 6years. Assuming an average, relatively modest importation rate of 200,000 tonnes/year, the current best estimate of the life of the facility is just over 3 years.

2.4 Environmental Monitoring

There is an established programme of environmental monitoring at the site which records emissions from the established construction and demolition waste recovery facility and the adjacent concrete production and aggregate processing facilities. It is envisaged that this programme will be expanded in accordance with requirements set by the waste licence issued by the Environmental Protection Agency. Environmental sampling, monitoring and testing for noise, dust, surface water and groundwater will be undertaken by in-house staff and/or independent external consultants as required. Records of environmental monitoring and testing will be maintained on-site and will be forwarded to the EPA / Wicklow County Council as required.

3 HUMAN BEINGS

Waste recovery, aggregate and concrete production activities have been established at Roadstone Dublin's existing landholding for some period of time. The impacts of a temporary intensification in waste recovery activities on human beings, principally those arising from backfilling of the former quarry, will lead to a marginal increase in noise and/or dust levels at the 9 residences closest to the site. These impacts are most likely to arise when backfilling and restoration works are being undertaken at the northern end of the worked out quarry. There will be negligible impact on much of the other residential housing in the locality.

The importation of inert / construction and demolition materials via the existing local road network may also have temporary adverse implications for existing traffic levels or the safety of traffic movements along Fassaroe Avenue. A number of measures proposed to enhance traffic flow and safety impacts will be (and recently have been) implemented along Fassaroe Avenue.

The principal long-term impact of backfilling the existing void to former ground level will be the removal of an unsightly feature in the landscape and reinstatement of the site to its pre-extraction landform. At the end of the operational life of the backfilling operation, there will be a reduction in traffic movements over the local road network leading to and from the site, with consequent improvement of the human environment.

4 ECOLOGY

Backfilling of the existing void space will result in the loss of any flora and disturbance of any fauna that have naturally colonised the worked-out pit, most notably around the south-western corner of the northern pond and the hummocky soils mounds on the eastern side. It will also result in the loss of groundwater ponds on the floor of the former gravel quarry which could provide a wetland habitat to wintering birds or breeding birds during summer periods.

Hedgerows above the northern face of the former quarry and along the northern perimeter act as a visual and acoustic barrier and will remain in place for the duration of waste recovery activity at the application site. If hedgerows are covered in dust as a result of placement, spreading and compaction of the inert soils and stones or recovery of C&D waste, it may impede their growth. A number of mitigation measures are to be implemented to eliminate and/or minimise the impact of

waste recovery activities on flora and fauna at the site.

As backfilling works are completed, the site will be progressively restored to agricultural pasture lands. This will be in keeping with the surrounding area which is composed predominately of improved agricultural land. This process will result in the former sand and gravel quarry being returned to its original land use. The arable farmland which is located within and immediately beyond the boundary of the application site will not be directly affected by waste recovery activity.

5 SOILS AND GEOLOGY

Topsoil (the upper layer of soil capable of sustaining vegetation and crop growth) was previously stripped from the site in order to facilitate the development of the former quarry and is currently stockpiled in hummocky mounds along the eastern side of the existing quarry void. Soils in the vicinity of the site typically have a wide use range of agricultural uses, principally tillage.

Published geological maps indicate that the natural subsoils at the site principally comprise sand and gravel of limestone and that the underlying rock comprises slates and sandstones. The available ground investigation information indicates that the general subsoil profile across the site comprises varying depths of filled ground over sand with clay layers. There is no evidence of soil contamination at the site.

The Geological Survey of Ireland has confirmed that there are no proposed geological National Heritage (pNHA) sites in the vicinity of the site. Although no site of geological or geomorphological interest is identified within Roadstone Dublin's landholding in the Wicklow County Development Plan (2004 to 2010), one is identified north-west of Roadstone Dublin's landholding, around the Fassaroe junction on the N11 National Primary Road.

The backfilling and restoration of the site to former ground level will eliminate ongoing soil erosion and the risk of potential instability in slopes across the site. It will eliminate existing soil exposures, though these are considered to be of limited geological interest value. It will also provide for the re-establishment of agricultural soils across the site.

The importation of soil, stones and inert construction and demolition waste introduces a risk of potential soil contamination at the site. Assuming best practice management procedures are employed in operating the facility, this risk of soil contamination is considered to be small.

6 WATER

Prior to its development as a quarry, the site was located on lime rich soils which were generally well draining. The subsoils occurring across and beneath the entire site comprise sand and gravel derived (mainly) from limestone. The sands and gravels extend across much of the Fassaroe area, are typically in excess of 20m thick and are classified as a regionally important aquifer.

The lack of surface water features across the area, indicates that the sand and gravel aquifer has a high level of recharge (infiltration by rainfall) and a high permeability. Groundwater is classified as highly vulnerable because permeable strata are located close to the ground surface and there is potential for rapid movement of water through the ground.

The deep level groundwater aquifer in the sand and gravel aquifer has not been intercepted by the former quarry workings. There are a number of surface water ponds on the floor of the former quarry. These are formed by ponding of rainfall and surface run-off (drainage) above a layer of impermeable silt on the quarry floor. The silt is essentially an unwanted by-product of sand processing and washing elsewhere on the Roadstone Dublin's lands. Available groundwater well information indicates that the ponds in the quarry floor are perched approximately 5m – 7m above the groundwater table in the sand and gravel aquifer.

Published data suggests that the bedrock inhibits groundwater flow (in that it has low permeability) with groundwater storage and movement constrained to the upper weathered horizons of this unit and fractures / faults.

Recent ground investigations indicate that groundwater quality at the site is generally very good, with established site operations shown to have no significant impact on existing groundwater quality.

The proposed filling area is not in close proximity to local watercourses. Public records from the Office of Public Works indicate that the site is not at risk of flooding.

Potential impacts of infilling the former sand and gravel quarry with inert materials have been assessed and it is considered that in the absence of mitigation measures, the development could have the potential to negatively impact groundwater quality and groundwater flow, particularly if contaminated soils were placed at the site or if fuel or chemical spillages occurred.

It is therefore proposed that a number of mitigation measures be incorporated into the scheme, including **prior removal of ponded water before backfilling and installation of a separator tank to remove possible contamination from surface water run-off arising in the concrete production yard,** site management measures (particularly in respect of fuelling and maintenance activities), placement of specific waste types in particular areas and review of waste types entering the site. With the incorporation of the proposed mitigation measures the residual risk to groundwater is considered to be low.

7 AIR QUALITY

Given the inert nature of the materials being used to restore the site and the absence of biodegradeable (organic) wastes, no landfill gas emissions will arise at this site.

The principal air quality impact associated with the continued operation of the inert waste recycling facility is fugitive dust emission. Emissions are likely to arise during

(i) trafficking by HGVs over unpaved surfaces
(ii) end-tipping of inert soil or construction and demolition waste
(iii) stockpiling, handling and compaction of inert soils and
(iv) processing (crushing / screening) of construction and demolition waste

In order to control dust emissions, a number of measures will be implemented, principally

(i) spraying of water from a tractor drawn bowser on dry exposed soil surfaces
(ii) planting with grass as soon as practicable after placement of cover soils to minimise soil erosion and dust emissions and
(iii) construction of internal haul roads using recycled aggregate (with low silt and clay content)
(iv) routing all HGVs leaving site through a temporary wheelwash facility at the end of the paved internal road leading to the waste recovery facility.

The amount of dust or fines carried onto the public road network will be further reduced by periodic sweeping of the paved internal access road and the existing local road in front of the site.

8 NOISE

Noise monitoring at the site indicates that average ambient noise levels typically range between 45dBA L_{Aeq} and 62dBA L_{Aeq}. These noise levels are consistent with daytime levels in suburban areas around the Greater Dublin Area and/or close to national road infrastructure. The existing noise levels exceed threshold limits for daytime noise emissions (55dBA L_{Aeq}) recommended by the EPA Environmental Management Guidelines for the Extractive Sector (2006).

The worst case scenario in relation to potential temporary noise impact arises at residences beyond the northern site boundary, along Berryfield Road, when quarry backfilling activity takes place at the northern end of the former quarry. Spreading and compaction plant and HGV trucks will be at the shortest distance from the residences at this time. Noise assessment indicates that in a worst case scenario, cumulative noise levels arising from intensive backfilling activities and operation of the crushing / screening plant *100% of the time* could marginally exceed permissible threshold limits. In reality however, this is unlikely to occur. Predicted (maximum) future noise levels are comparable to existing levels, making it unlikely that any exceedence of threshold noise levels will be noticed by nearby residents.

It is proposed to monitor average noise levels during the operation of the waste recovery facility at the Fassaroe site. Should these indicate that average noise limits are exceeded (or likely to be exceeded); provision will be made for a combination of one or more of the following in order to reduce noise levels:

(i) construction of a temporary screening embankment,
(ii) installation of a temporary noise barrier between noise source and receptor(s)
(iii) reduction of noise emissions at source
(iv) management of activities to minimise vehicular movements and/or duration of activities in the vicinity of affected residences.

While the noise levels experienced at the affected residences may exceed threshold limits, any impact will be temporary in nature. This impact is considered acceptable in view of the overall environmental improvement that the site restoration works will effect.

9 CULTURAL HERITAGE

The cultural heritage study in respect of the waste recovery facility at Fassaroe, Co. Wicklow comprising a paper study and fieldwork was carried out in November and December 2008. A wide variety of paper, cartographic, photographic and archival sources was consulted. Consultation was also carried out with a wide range of planning consultees. All the lands impacted by the development were visually inspected.

Given the history of quarrying, aggregate processing and waste recovery activities at the site, it is considered that continued recycling of construction and demolition waste and backfilling of the former quarry will have no direct or indirect impact on any items of cultural heritage, including archaeological resources and architectural heritage.

10 LANDSCAPE

The inert waste recovery facility at Fassaroe is located within a rural landscape whose character is classified as an *Area of Outstanding Natural Beauty* by the County Wicklow Development Plan 2004-2010. Although the area is physically quite open, its rural character has been significantly eroded owing to high levels of suburban type development, in the form of roads, housing and industry. The predominant land use in the surrounding area is agricultural, principally tillage, with some pasture and forestry on sloping ground.

Given the gently sloping nature of the landscape surrounding the application site and the presence of boundary hedgerows, there are only limited long-distance views into the site. There are some views into the site from local roads where breaks occur in the line of hedgerows around the site boundary.

The inert waste recovery facility will not have any significant impacts on designated scenic roads and viewpoints on account of its location; the intervening undulating topography and screening by hedgerows. The application site is too distant and fully screened by intervening vegetation to be perceptible from any designated view or prospect.

The quarry backfilling activities are expected to have only limited temporary visual impact from nearby residences due to the natural screening afforded the site by the surrounding landscape elements, a combination of the undulating topography and existing hedgerows. The phasing of backfilling operations will minimise the area being actively restored and open to view at any time.

Ultimately, the worked-out quarry will be returned to former ground level and restored to beneficial use as agricultural pasture. On completion, the site will blend into the surrounding landscape, eliminating any negative visual impact which currently arises.

Landscape mitigation measures will be put in place to minimise any potential visual impact associated with the proposed restoration scheme. These include

i) retaining all hedgerows along the site boundary;
ii) removing any temporary plant, infrastructure and paved surfaces on completion of backfilling works and
iii) grading the final landform at a shallow angle to merge with the surrounding landscape.

11 MATERIAL ASSETS

Access to the inert waste recovery facility at Fassaroe is along a private road which has a number of one-off residential units located intermittently along it. There is no other transport infrastructure in the vicinity of the site.

There are several residential clusters in the immediate vicinity of the site, mainly located along the side of existing local roads. The sand and gravel deposits beneath the site are classified as a locally important gravel aquifer, although it is understood that houses in the vicinity of the site source drinking water from Local Authority Mains supply.

The level of HGV movements to and from the inert waste recovery facility could increase, depending on the rate of importation of soil and stones. Backfilling activities at the site present a number of risks to groundwater quality. However a number of measures will be implemented to minimize these risks. There may be some short-term impacts on residential amenity for residents living immediately north of the site, most notably an increase in ambient noise and dust emissions. A number of measures will be implemented to minimize such emissions.

In the long-term, backfilling of the former quarry with inert material will increase protection to, and reduce the vulnerability of, the existing groundwater aquifer. It will also have a neutral, possibly beneficial, impact on land values and/or residential property values.

12 TRAFFIC

The proposed waste activities at Fassaroe entail backfilling the existing quarry void using imported inert soils and stones and/or some limited recovered construction and demolition waste. HGV trucks carrying soil and stones to the waste recovery facility will use the existing quarry access road i.e. Fassaroe Avenue, and may generate an increase in traffic levels along it and the local road network.

Fassaroe Avenue currently has a number of traffic calming elements incorporated along its length; these traffic calming elements take the form of a series of ramps incorporating road narrowings. In addition to providing access to the quarry, Fassaroe Avenue provides access to 9 No. private properties. The existing visibility from two of these properties is restricted by their own existing fencelines.

On-site observations and traffic speed surveys indicate that existing traffic speed along Fassaroe Avenue generally exceeds the recommended limit.

In the worst case scenario, the increase in traffic flows generated by the proposed development will result in an additional 20 No. HGV movements during the peak hour period, and result in a maximum flow of vehicular flow of 97 in the peak period.

In order to mitigate against the impact of the remediation works upon the local road network a number of measures have recently been implemented to reduce traffic speed and improve traffic safety. It is also proposed to locally realign the road outside of two existing properties. The proposed improvements will improve the visibility splays at the two properties with reduced visibility.

ATTACHMENT I1 – ASSESSMENT OF IMPACT ON RECEIVING SURFACE WATER

The nearest watercourse to the application site is the Cookstown River, which is a tributary of the River Dargle, and located within the Eastern Liffey River Basin District. The Cookstown River runs along and beyond the southern boundary of the Applicant's landholding and at a ground level (40mOD) approximately 45m-50m below that across the proposed waste recovery facility (85mOD to 90mOD).

All existing surface water ponds within the application site and within the Applicant's wider landholding are considered to be groundwater features. Meteoric water falling over existing and/or future landforms at the application site will either run over the surface to groundwater ponds forming in closed depressions within the site or will percolate through backfilled and/or natural soil to the underlying groundwater table.

No emissions to watercourses beyond the Applicants property boundary will take place over the operational life of the proposed waste recovery facility.

Details of the existing surface water environment and the impact of the proposed waste recovery facility and associated emissions thereon are provided in Section 6 of the Environmental Impact Statement. **Additional details are provided in a Water Management Plan submitted to the Agency in response to a request for further information dated 7 October 2010 (incorporated as Appendix 2.3 of the Environmental Impact Statement).**

The existing / proposed monitoring regime at surface water bodies is outlined in Section 2.6.10 of the Environmental Impact Statement.

ATTACHMENT F4 – SURFACE WATER MONITORING AND SAMPLING

Details of the surface water monitoring and sampling to be undertaken at the proposed waste recovery facility are provided in Section 2.6.10 of the Environmental Impact Statement.

Sampling and testing of surface water at existing surface water bodies across the floor of the former quarry will continue for as long as these surface water bodies remain in place. Sampling and testing will be discontined once the ponds are pumped dry and backfilled.

Existing monitoring locations are shown in Figure F4.1 and Figure 2.11 of the Environmental Impact Statement. It should be noted that technically all existing surface water bodies within the application site are deemed to be groundwater features.

Monitoring Reference No.	Parameter	Monitoring Frequency	Location (Grid Co-ordinates)	Accessibility of Sampling Points
SW1	Note 1	Bi-annually	323853N 217673E	Easy : edge of existing pond
SW2	**Note 1**	**Bi-annually**	**323922N 217472E**	**Easy : edge of existing pond**
SW3	**Note 1**	**Bi-annually**	**323323N 217637e**	**Easy : existing concrete yard**

Note 1 : Surface water test parameters to include Temperature, pH, Dissolved Oxygen, Conductivity, Sodium, Potassium, Chloride, Ammoniacal Nitrogen, Sulphate, Dissolved Metals (Ca, Cu, Fe, Pb, Mg, Mn, Ni and Zn) and Total Alkalinity

Table F4.1 Surface Water Monitoring Points

ATTACHMENT E1 – EMISSIONS TO SURFACE WATER

The nearest watercourse to the application site is the Cookstown River, which is a tributary of the River Dargle, and located within the Eastern Liffey River Basin District. The Cookstown River runs along and beyond the southern boundary of the Applicant's landholding and at a ground level (40mOD) approximately 45m-50m below that across the proposed waste recovery facility (85mOD to 90mOD).

Currently, **most** rainfall across the application site either percolates downwards through the unsealed ground to the underlying groundwater aquifer and **only a limited amount (if any)** runs over the ground surface to the two existing surface ponds in the bottom of the worked out quarry.

There is no site drainage infrastructure to collect and/or remove surface water run-off at the recovery facility other than that provided at the concrete slab at the waste inspection and quarantine facility. Waste inspection and quarantine facilities are located within a portal frame structure constructed over the concrete slab. As incipient rainfall will not come into contact with consignments of suspected contaminated waste stored at the covered shed, there is no requirement to install **separate or dedicated** drainage infrastructure to provide for collection and storage of potentially contaminated surface water run-off.

No emissions to **watercourses beyond the Applicant's property boundary will take place** during the quarry restoration works or over the operational life of the construction and demolition waste recovery facility.

All existing surface water ponds within the application site and within the Applicant's wider landholding occur within closed depressions and are considered to be perched groundwater features. Meteoric water falling over existing and/or future landforms at the application site will either run over the surface to these perched groundwater features or will percolate through backfilled and/or natural soil to the underlying groundwater table.

Further details of surface water management at the waste recycling facility are provided in Section 2.2.9 of the Environmental Impact Statement which accompanies this application. **Additional detail is provided in a Water Management Plan submitted to the Agency in response to a request for further information dated 7 October 2010 (incorporated as Appendix 2.3 of the Environmental Impact Statement).**

ROADSTONE DUBLIN LIMITED

INERT WASTE RECOVERY FACILITY

AT FASSAROE, BRAY, CO. WICKLOW

WASTE LICENCE APPLICATION ATTACHMENT A

NON-TECHNICAL SUMMARY

REVISION A
OCTOBER 2010

Prepared by :
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(ii) recycling of construction and demolition waste.

The location of the site is indicated on an extract from the 1:50,000 scale Ordnance Survey Discovery series map of the area, reproduced as Figure 1. At the present time, traffic access to the site and is via the Fassaroe Junction on the N11 National Primary Road, along a section of local public road (Kilbride Road) and a 930m long private road (Fassaroe Avenue).

The amount of inert material to be imported and placed at the facility over its operational life is 750,000 tonnes (approximately 375,000m^3), of which approximately 620,000 tonnes must be imported. Up to an estimated 20,000 tonnes of inert construction and demolition waste will also be recovered at the facility on an annual basis. Inert materials to be placed and recovered at the facility will be sourced from construction and/or demolition sites where prior testing has indicated that no soil or material contamination is present.

The application area comprises a worked out quarry and surrounding land measuring covering an area of approximately 21.4hectares (51.5acres). Roadstone Dublin obtained planning permission for the existing construction and demolition waste facility at the application site in July 2004 (Wicklow County Council Planning Ref. No. 03/9501). The company also obtained waste permits in respect of these activities from Wicklow County Council (Ref. No. ESS/15/8/12) for successive three years periods from 2004. A grant planning permission to backfill and restore the quarry void was issued by Wicklow County Council on 4 March 2009 (Planning Register Ref. No. 08/1258).

The proposed recovery of inert soils at the former sand and gravel quarry at Fassaroe will eventually result in complete backfilling of a large open void, restore the landscape to its original pre-extraction condition and provide for better protection of the underlying groundwater resource, which is currently classified as 'highly vulnerable' due to the absence of any protective soil cover. The scheme will also provide for future development of the lands which are zoned for mixed use development in the Draft Bray Environs Local Area Plan 2009-2015.

2 RESTORATION SCHEME

2.1 Principal Elements

The proposed inert waste recovery facility at Fassaroe provides for

(i) Use of imported inert natural materials, principally excess soil, stones and/or broken rock excavated on construction sites, to backfill and restore a large existing void created by previous extraction of sand and gravel
(ii) Recovery of imported inert construction materials, including stones, granular fill, concrete, blocks, bricks and ceramic tile, using crushing and screening equipment to generate secondary (recycled) aggregate
(iii) Separation of any non-inert construction and demolition waste (principally metal, timber, PVC pipes and plastic) unintentionally imported to site prior to removal off-site to appropriately licensed waste disposal or recovery facilities
(iv) Use of secondary aggregate to construct internal haul roads within and across the application site
(v) Export of secondary aggregate off-site for re-use by others
(vi) Phased restoration of the backfilled void (including placement of cover soils and seeding) and return to use as agricultural grassland
(vii) Temporary stockpiling of topsoil and subsoil pending re-use as cover material for phased restoration of the site
(viii) Environmental monitoring of noise, dust, surface water and groundwater for the duration of the site restoration works.

2.2 Site Infrastructure

Inert materials are accepted at the site between 08.00 hours and 18.00hours each weekday and 08.00hours to 13.00hours on Saturday. Vehicular access to Roadstone Dublin's landholding and the waste recovery facility can only be obtained via Fassaroe Avenue. All vehicular traffic arriving must stop at the weighbridge in front of the existing site office before gaining access to the waste recovery facility. Within the site, trucks travel to and from the active restoration and recycling areas over a network of paved and unpaved roads. Trucks must pass through a new wheelwash facility before exiting the site.

Fuel for site plant and equipment will be stored at the existing maintenance sheds on Roadstone Dublin's landholding and/or in mobile double skin bowsers. HGV trucks can refuel at the existing refuelling facilities adjacent to the existing concrete production yard. Oil and lubricant changes for both wheeled and tracked plant will be undertaken at existing maintenance sheds.

A temporary portacabin office will be provided at the waste recovery facility, at the location shown on Figure 2. Staff employed at the facility will share established staff facilities with other Roadstone Dublin staff employed the concrete production and aggregate processing facilities which are located on the same landholding.

A waste inspection and quarantine area will be established at an existing A-frame shed at the concrete production yard which is constructed over a sealed concrete slab. Visual inspection, in-situ monitoring and testing of imported waste materials will be undertaken by Roadstone Dublin staff as inert waste materials are end-tipped, spread and placed at the active restoration area. Should there be any concern about the nature of the soil materials being end-tipped it will be loaded onto a truck and re-directed to the waste inspection and quarantine area for closer examination and inspection. Any suspect or unacceptable waste identified will be placed in skips and covered with plastic sheeting in order to minimise potential contamination of surface water run-off.

A temporary hardstanding area constructed of recycled aggregate is currently provided on the western side of the worked out quarry and is currently used for recovery of imported inert construction and demolition waste. Construction and demolition waste is recycled by passing it through a mobile crushing plant in order to create a particulate, granular fill which may exported off-site as secondary aggregate or alternatively may be used to construct hardstanding areas or temporary haul roads within the Fassaroe complex. Provision will be made for storage of any separated non-inert construction and demolition waste (including metal, timber, plastic etc.) at the waste inspection area prior to removal off-site to a licensed recovery facility.

Most rain falling over the site will percolate through backfilled or natural soils to the underlying groundwater table. Any surface water run-off **which falls over unpaved ground will be either be diverted to infiltration areas to be absorbed directly into the ground or** will flow over the ground surface to collect in existing surface ponds. Water collecting in surface ponds will ultimately discharge to the underlying groundwater table **or will be pumped to the existing large pond immediately south of the existing concrete production yard (known as the 'supply pond').**

Water in the silt ponds will be tested to confirm it meets quality standards prior to being discharged to the supply pond. A separator tank will be installed at the concrete production yard to treat any petrol or fuel contamination of surface water run-off which could potentially arise there. Pumping of surface water run-off from the concrete yard will be undertaken continuously to prevent surface water from ponding around low points.

2.3 Waste Recovery Activities

Backfilling of the former quarry will proceed in several phases and on completion, will merge into the surrounding landscape. A summary of the proposed phasing and the final ground level contours are shown in Figure 3.

It is currently envisaged that backfilling of the existing void will proceed from the northern to the southern end of the quarry, in 4 No. separate phases. Any temporary additional or replacement infrastructure required to facilitate the proposed works will be constructed and/or installed at the

outset of the first phase of backfilling. On completion of each restoration phase, a cover layer of subsoil and topsoil will be placed and graded across the backfilled soil. This will then be planted with grass in order to promote stability and minimise soil erosion and dust generation.

Near the end of the fourth (and final) phase of the quarry backfilling works, all relevant plant and equipment will be removed off site and any temporary infrastructure and/or services will be progressively removed or decommissioned. At the end of the backfilling operation, the ground surface will be profiled to give a domed shape to facilitate surface water run-off into in-situ sand and gravel soils beyond the backfilled area. The final landform will be similar to that existed prior to extraction of sand and gravel.

It is estimated that the rate of importation of inert materials to the quarry void could vary between 100,000 tonnes and 550,000 tonnes per annum. The corresponding duration of backfilling activities could therefore vary from just over 1year to 6years. Assuming an average, relatively modest importation rate of 200,000 tonnes/year, the current best estimate of the life of the facility is just over 3 years.

2.4 Environmental Monitoring

There is an established programme of environmental monitoring at the site which records emissions from the established construction and demolition waste recovery facility and the adjacent concrete production and aggregate processing facilities. It is envisaged that this programme will be expanded in accordance with requirements set by the waste licence issued by the Environmental Protection Agency. Environmental sampling, monitoring and testing for noise, dust, surface water and groundwater will be undertaken by in-house staff and/or independent external consultants as required. Records of environmental monitoring and testing will be maintained on-site and will be forwarded to the EPA / Wicklow County Council as required.

3 HUMAN BEINGS

Waste recovery, aggregate and concrete production activities have been established at Roadstone Dublin's existing landholding for some period of time. The impacts of a temporary intensification in waste recovery activities on human beings, principally those arising from backfilling of the former quarry, will lead to a marginal increase in noise and/or dust levels at the 9 residences closest to the site. These impacts are most likely to arise when backfilling and restoration works are being undertaken at the northern end of the worked out quarry. There will be negligible impact on much of the other residential housing in the locality.

The importation of inert / construction and demolition materials via the existing local road network may also have temporary adverse implications for existing traffic levels or the safety of traffic movements along Fassaroe Avenue. A number of measures proposed to enhance traffic flow and safety impacts will be (and recently have been) implemented along Fassaroe Avenue.

The principal long-term impact of backfilling the existing void to former ground level will be the removal of an unsightly feature in the landscape and reinstatement of the site to its pre-extraction landform. At the end of the operational life of the backfilling operation, there will be a reduction in traffic movements over the local road network leading to and from the site, with consequent improvement of the human environment.

4 ECOLOGY

Backfilling of the existing void space will result in the loss of any flora and disturbance of any fauna that have naturally colonised the worked-out pit, most notably around the south-western corner of the northern pond and the hummocky soils mounds on the eastern side. It will also result in the loss of groundwater ponds on the floor of the former gravel quarry which could provide a wetland habitat to wintering birds or breeding birds during summer periods.

Hedgerows above the northern face of the former quarry and along the northern perimeter act as a visual and acoustic barrier and will remain in place for the duration of waste recovery activity at the application site. If hedgerows are covered in dust as a result of placement, spreading and compaction of the inert soils and stones or recovery of C&D waste, it may impede their growth. A number of mitigation measures are to be implemented to eliminate and/or minimise the impact of

waste recovery activities on flora and fauna at the site.

As backfilling works are completed, the site will be progressively restored to agricultural pasture lands. This will be in keeping with the surrounding area which is composed predominately of improved agricultural land. This process will result in the former sand and gravel quarry being returned to its original land use. The arable farmland which is located within and immediately beyond the boundary of the application site will not be directly affected by waste recovery activity.

5 SOILS AND GEOLOGY

Topsoil (the upper layer of soil capable of sustaining vegetation and crop growth) was previously stripped from the site in order to facilitate the development of the former quarry and is currently stockpiled in hummocky mounds along the eastern side of the existing quarry void. Soils in the vicinity of the site typically have a wide use range of agricultural uses, principally tillage.

Published geological maps indicate that the natural subsoils at the site principally comprise sand and gravel of limestone and that the underlying rock comprises slates and sandstones. The available ground investigation information indicates that the general subsoil profile across the site comprises varying depths of filled ground over sand with clay layers. There is no evidence of soil contamination at the site.

The Geological Survey of Ireland has confirmed that there are no proposed geological National Heritage (pNHA) sites in the vicinity of the site. Although no site of geological or geomorphological interest is identified within Roadstone Dublin's landholding in the Wicklow County Development Plan (2004 to 2010), one is identified north-west of Roadstone Dublin's landholding, around the Fassaroe junction on the N11 National Primary Road.

The backfilling and restoration of the site to former ground level will eliminate ongoing soil erosion and the risk of potential instability in slopes across the site. It will eliminate existing soil exposures, though these are considered to be of limited geological interest value. It will also provide for the re-establishment of agricultural soils across the site.

The importation of soil, stones and inert construction and demolition waste introduces a risk of potential soil contamination at the site. Assuming best practice management procedures are employed in operating the facility, this risk of soil contamination is considered to be small.

6 WATER

Prior to its development as a quarry, the site was located on lime rich soils which were generally well draining. The subsoils occurring across and beneath the entire site comprise sand and gravel derived (mainly) from limestone. The sands and gravels extend across much of the Fassaroe area, are typically in excess of 20m thick and are classified as a regionally important aquifer.

The lack of surface water features across the area, indicates that the sand and gravel aquifer has a high level of recharge (infiltration by rainfall) and a high permeability. Groundwater is classified as highly vulnerable because permeable strata are located close to the ground surface and there is potential for rapid movement of water through the ground.

The deep level groundwater aquifer in the sand and gravel aquifer has not been intercepted by the former quarry workings. There are a number of surface water ponds on the floor of the former quarry. These are formed by ponding of rainfall and surface run-off (drainage) above a layer of impermeable silt on the quarry floor. The silt is essentially an unwanted by-product of sand processing and washing elsewhere on the Roadstone Dublin's lands. Available groundwater well information indicates that the ponds in the quarry floor are perched approximately 5m – 7m above the groundwater table in the sand and gravel aquifer.

Published data suggests that the bedrock inhibits groundwater flow (in that it has low permeability) with groundwater storage and movement constrained to the upper weathered horizons of this unit and fractures / faults.

Recent ground investigations indicate that groundwater quality at the site is generally very good, with established site operations shown to have no significant impact on existing groundwater quality.

The proposed filling area is not in close proximity to local watercourses. Public records from the Office of Public Works indicate that the site is not at risk of flooding.

Potential impacts of infilling the former sand and gravel quarry with inert materials have been assessed and it is considered that in the absence of mitigation measures, the development could have the potential to negatively impact groundwater quality and groundwater flow, particularly if contaminated soils were placed at the site or if fuel or chemical spillages occurred.

It is therefore proposed that a number of mitigation measures be incorporated into the scheme, including **prior removal of ponded water before backfilling and installation of a separator tank to remove possible contamination from surface water run-off arising in the concrete production yard,** site management measures (particularly in respect of fuelling and maintenance activities), placement of specific waste types in particular areas and review of waste types entering the site. With the incorporation of the proposed mitigation measures the residual risk to groundwater is considered to be low.

7 AIR QUALITY

Given the inert nature of the materials being used to restore the site and the absence of biodegradeable (organic) wastes, no landfill gas emissions will arise at this site.

The principal air quality impact associated with the continued operation of the inert waste recycling facility is fugitive dust emission. Emissions are likely to arise during

(i) trafficking by HGVs over unpaved surfaces
(ii) end-tipping of inert soil or construction and demolition waste
(iii) stockpiling, handling and compaction of inert soils and
(iv) processing (crushing / screening) of construction and demolition waste

In order to control dust emissions, a number of measures will be implemented, principally

(i) spraying of water from a tractor drawn bowser on dry exposed soil surfaces
(ii) planting with grass as soon as practicable after placement of cover soils to minimise soil erosion and dust emissions and
(iii) construction of internal haul roads using recycled aggregate (with low silt and clay content)
(iv) routing all HGVs leaving site through a temporary wheelwash facility at the end of the paved internal road leading to the waste recovery facility.

The amount of dust or fines carried onto the public road network will be further reduced by periodic sweeping of the paved internal access road and the existing local road in front of the site.

8 NOISE

Noise monitoring at the site indicates that average ambient noise levels typically range between 45dBA L_{Aeq} and 62dBA L_{Aeq}. These noise levels are consistent with daytime levels in suburban areas around the Greater Dublin Area and/or close to national road infrastructure. The existing noise levels exceed threshold limits for daytime noise emissions (55dBA L_{Aeq}) recommended by the EPA Environmental Management Guidelines for the Extractive Sector (2006).

The worst case scenario in relation to potential temporary noise impact arises at residences beyond the northern site boundary, along Berryfield Road, when quarry backfilling activity takes place at the northern end of the former quarry. Spreading and compaction plant and HGV trucks will be at the shortest distance from the residences at this time. Noise assessment indicates that in a worst case scenario, cumulative noise levels arising from intensive backfilling activities and operation of the crushing / screening plant *100% of the time* could marginally exceed permissible threshold limits. In reality however, this is unlikely to occur. Predicted (maximum) future noise levels are comparable to existing levels, making it unlikely that any exceedence of threshold noise levels will be noticed by nearby residents.

It is proposed to monitor average noise levels during the operation of the waste recovery facility at the Fassaroe site. Should these indicate that average noise limits are exceeded (or likely to be exceeded); provision will be made for a combination of one or more of the following in order to reduce noise levels:

(i) construction of a temporary screening embankment,
(ii) installation of a temporary noise barrier between noise source and receptor(s)
(iii) reduction of noise emissions at source
(iv) management of activities to minimise vehicular movements and/or duration of activities in the vicinity of affected residences.

While the noise levels experienced at the affected residences may exceed threshold limits, any impact will be temporary in nature. This impact is considered acceptable in view of the overall environmental improvement that the site restoration works will effect.

9 CULTURAL HERITAGE

The cultural heritage study in respect of the waste recovery facility at Fassaroe, Co. Wicklow comprising a paper study and fieldwork was carried out in November and December 2008. A wide variety of paper, cartographic, photographic and archival sources was consulted. Consultation was also carried out with a wide range of planning consultees. All the lands impacted by the development were visually inspected.

Given the history of quarrying, aggregate processing and waste recovery activities at the site, it is considered that continued recycling of construction and demolition waste and backfilling of the former quarry will have no direct or indirect impact on any items of cultural heritage, including archaeological resources and architectural heritage.

10 LANDSCAPE

The inert waste recovery facility at Fassaroe is located within a rural landscape whose character is classified as an *Area of Outstanding Natural Beauty* by the County Wicklow Development Plan 2004-2010. Although the area is physically quite open, its rural character has been significantly eroded owing to high levels of suburban type development, in the form of roads, housing and industry. The predominant land use in the surrounding area is agricultural, principally tillage, with some pasture and forestry on sloping ground.

Given the gently sloping nature of the landscape surrounding the application site and the presence of boundary hedgerows, there are only limited long-distance views into the site. There are some views into the site from local roads where breaks occur in the line of hedgerows around the site boundary.

The inert waste recovery facility will not have any significant impacts on designated scenic roads and viewpoints on account of its location; the intervening undulating topography and screening by hedgerows. The application site is too distant and fully screened by intervening vegetation to be perceptible from any designated view or prospect.

The quarry backfilling activities are expected to have only limited temporary visual impact from nearby residences due to the natural screening afforded the site by the surrounding landscape elements, a combination of the undulating topography and existing hedgerows. The phasing of backfilling operations will minimise the area being actively restored and open to view at any time.

Ultimately, the worked-out quarry will be returned to former ground level and restored to beneficial use as agricultural pasture. On completion, the site will blend into the surrounding landscape, eliminating any negative visual impact which currently arises.

Landscape mitigation measures will be put in place to minimise any potential visual impact associated with the proposed restoration scheme. These include

i) retaining all hedgerows along the site boundary;
ii) removing any temporary plant, infrastructure and paved surfaces on completion of backfilling works and
iii) grading the final landform at a shallow angle to merge with the surrounding landscape.

11 MATERIAL ASSETS

Access to the inert waste recovery facility at Fassaroe is along a private road which has a number of one-off residential units located intermittently along it. There is no other transport infrastructure in the vicinity of the site.

There are several residential clusters in the immediate vicinity of the site, mainly located along the side of existing local roads. The sand and gravel deposits beneath the site are classified as a locally important gravel aquifer, although it is understood that houses in the vicinity of the site source drinking water from Local Authority Mains supply.

The level of HGV movements to and from the inert waste recovery facility could increase, depending on the rate of importation of soil and stones. Backfilling activities at the site present a number of risks to groundwater quality. However a number of measures will be implemented to minimize these risks. There may be some short-term impacts on residential amenity for residents living immediately north of the site, most notably an increase in ambient noise and dust emissions. A number of measures will be implemented to minimize such emissions.

In the long-term, backfilling of the former quarry with inert material will increase protection to, and reduce the vulnerability of, the existing groundwater aquifer. It will also have a neutral, possibly beneficial, impact on land values and/or residential property values.

12 TRAFFIC

The proposed waste activities at Fassaroe entail backfilling the existing quarry void using imported inert soils and stones and/or some limited recovered construction and demolition waste. HGV trucks carrying soil and stones to the waste recovery facility will use the existing quarry access road i.e. Fassaroe Avenue, and may generate an increase in traffic levels along it and the local road network.

Fassaroe Avenue currently has a number of traffic calming elements incorporated along its length; these traffic calming elements take the form of a series of ramps incorporating road narrowings. In addition to providing access to the quarry, Fassaroe Avenue provides access to 9 No. private properties. The existing visibility from two of these properties is restricted by their own existing fencelines.

On-site observations and traffic speed surveys indicate that existing traffic speed along Fassaroe Avenue generally exceeds the recommended limit.

In the worst case scenario, the increase in traffic flows generated by the proposed development will result in an additional 20 No. HGV movements during the peak hour period, and result in a maximum flow of vehicular flow of 97 in the peak period.

In order to mitigate against the impact of the remediation works upon the local road network a number of measures have recently been implemented to reduce traffic speed and improve traffic safety. It is also proposed to locally realign the road outside of two existing properties. The proposed improvements will improve the visibility splays at the two properties with reduced visibility.

ATTACHMENT I3 – ASSESSMENT OF IMPACT ON GROUND / GROUNDWATER

A ground investigation was completed at the application site in December 2008 to investigate the nature of the inert fill materials and the surrounding ground and groundwater conditions. The available ground investigation information indicates that the general subsoil profile across the application site comprises varying depths of Made Ground overlying sand and silty clay. Further details of the existing soil and subsoil environment are provided in Section 5 of the Environmental Impact Statement. The details of the site investigation are reported in the Ground Investigation Report reproduced in Appendix 5.1 of the Environmental Impact Statement.

Available groundwater test data indicates that there is no contamination of existing groundwater beneath the application site, nor any disparity between the groundwater quality of samples recovered at upgradient and downgradient of the site. This suggests that historical activities at the Fassaroe site have had no adverse impact on groundwater quality.

Backfilling and restoration of the former gravel quarry at Fassaroe entails placement and backfilling using only inert soil and stones and minor quantities of inert secondary aggregate. The C&D wastes recovered (processed) on hardstanding surfaces at the facility are also inert. As such, no soil or groundwater contamination will arise from percolation of rainfall through the backfilled ground or existing hardstanding surfaces.

Details of the existing groundwater environment and the impact of the proposed waste recovery facility and associated emissions thereon are provided in Section 6 of the Environmental Impact Statement. **Additional detail is provided in a Water Management Plan submitted to the Agency in response to a request for additional information dated 7 October 2010 (incorporated as Appendix 2.3 of the Environmental Impact Statement).**

The proposed groundwater monitoring regime is outlined in Section 2.6.4 of the Environmental Impact Statement.

N3
D3 (PROPOSED)
EXISTING POND
SW4
BH02
N5 (PROPOSED)
SW3
CONCRETE PRODUCTION YARD
SILT AREA
BH03
AGGREGATE PROCESSING PLANT & STOCKPILES
SILT AREA
EXISTING POND
N2
SILT POND / CLOSED DEPRESSION
SW2
BH01
N4
D2
D1
N1

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

0059.00017.18.FIG 2.11.R1.ENV MONITORING LOCATIONS

N
W E
S

NOTES

1. Based on OSi 6inch sheet no. 21

2. Ordnance Survey Ireland Licence no. SU 0000709 (c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

- Applicant's Land Interest (c. 65.1 ha)
- Waste Licence Application Area (c. 21.4 ha)
- Location of Residences
- Building
- N1 Noise Monitoring Locations
- D1 Dust Monitoring Locations
- Groundwater Monitoring Location
- SW1 Surface Water Monitoring Location

Revision	By	Chk'd By	Date	Comments
1	EW	DL	19/10/2010	SW2 & SW3 ADDED

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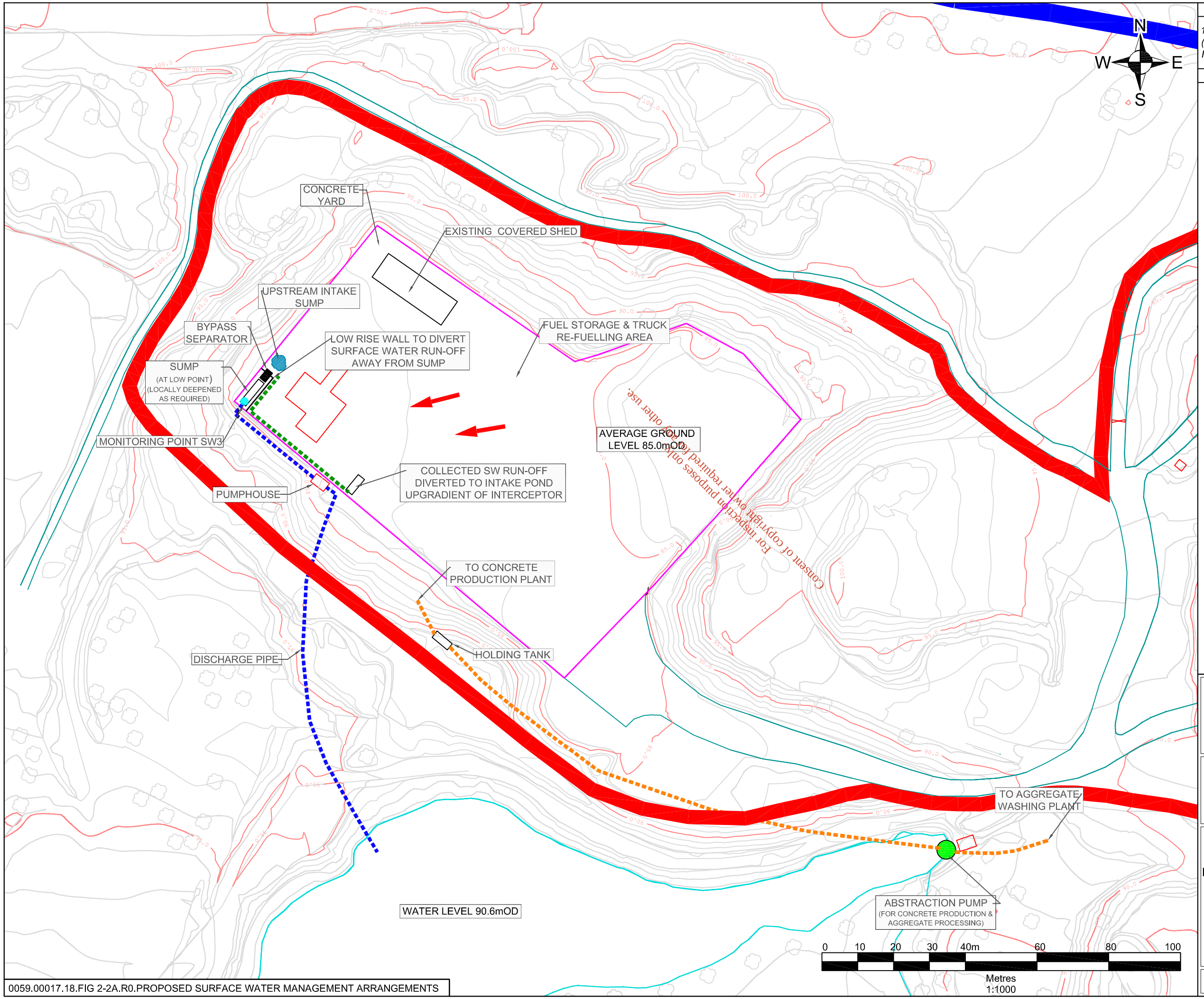
WASTE LICENCE APPLICATION

FASSAROE WASTE RECOVERY FACILITY
FASSAROE, BRAY, CO.WICKLOW

ENVIRONMENTAL MONITORING LOCATIONS

FIGURE 2-11

Scale	Date
1:5,000	OCTOBER 2010



NOTES

1. Ordnance Survey Ireland Licence no. SU 0000710 (c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

- Applicant's Land Interest (c. 65.1 ha)
- Waste Licence Application Area (c. 21.4 ha)
- Groundwater Monitoring Location
- SW3 — Surface Water Monitoring Location
- Flow Direction of Water Run-off

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FASSAROE WASTE RECOVERY FACILITY
FASSAROE, BRAY, CO.WICKLOW

PROPOSED SURFACE WATER MANAGEMENT ARRANGEMENTS

FIGURE 2-2A

Scale	Date
1:1,000	OCTOBER 2010

0059.00017.18.FIG 2-2A.R0.PROPOSED SURFACE WATER MANAGEMENT ARRANGEMENTS

N
W E
S

EXISTING POND

SW1

SILT AREA

AGGREGATE PROCESSING PLANT & STOCKPILES

SILT AREA

EXISTING POND

SW2

SW3

CONCRETE YARD

BLOCK YARD

WEIGHBRIDGE

STORAGE YARD

RETAIL AREA & EMPLOYEE PARKING

EXISTING SITE OFFICE

SITE GATE

MAINTENANCE SHED

SILT POND / CLOSED DEPRESSION

0 80m 200
Metres
1:2500

0059.00017.18.FIG F4.R1.SW MONITORING LOCATIONS

NOTES

1. Based on OSi 6inch sheet no. 21

2. Ordnance Survey Ireland Licence no. SU 0000709 (c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

- Applicant's Land Interest (c. 65.1 ha)
- Waste Licence Application Area (c. 21.4 ha)
- Internal Unpaved Road
- Internal Paved Road
- Building
- Surface Water Monitoring Location

Revision	By	Chk'd By	Date	Comments
1	EW	DL	19/10/2010	SW2 & SW3 ADDED

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FASSAROE, BRAY, CO.WICKLOW

SURFACE WATER MONITORING LOCATION

FIGURE F4-1

Scale	Date
1:2,500	OCTOBER 2010